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May 1, 1947

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If you add old coffee grounds to a compost heap, earthworms multiply very rapidly. This, I feel sure, helps to accelerate the making of compost, not to mention, providing a means for disposing of an otherwise useless product.

Philip H. Smith,
Pawling, N. Y.

Editor—We agree.

—o—

ENTHUSIASM

May 7, 1947

I am receiving "Organic Gardening Magazine". I am an Englishman and I remember in England the lovely gardens we had from "Organics". Now I work for a company, one of the largest producers of chemical fertilizers in the world and we put out thousands of tons every year. The base of this fertilizer is sulphuric acid. Use this fertilizer once and I will guarantee you won't have one worm in your garden. You will raise vegetables but they are really tasteless; and remember, two heavy rains after an application and they are gone. You have no worms to work for you. They are killed by the first heavy rain. I have a very heavy clay soil and have worked it 6 years. The first year I limed it heavy, and sifted about 3 tons of ashes over it in the fall, in the spring I put in some

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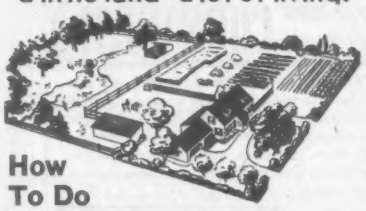

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horse manure and turned it under and everyone was laughing at me and asking me what the (Blank) you think you're going to raise. I told them I have already raised a crop of blisters and if you guys don't stay away I am going to raise a short temper and this fork is going to stick something softer than this brick garden I am trying to dig. Well the kidding went on, you see we have a small community, all neighbours, all work for the same concern and every one has grass all around. Well I told them go fly a kite, leave me alone and brother in six weeks I'll bring you all some radishes for supper. Well that drew plenty laughs. So I dug and dug. Then I thought well now I've got to make good, so I got 50 lbs. sheep manure pulverized and opened up my rows. I planted two ounces of radish seed in sheep manure and in 6 weeks I went out and pulled radishes in a bushel basket and went from house to house making good my promise. Then they took notice and everybody who has a garden—well they are using chemical fertilizers. I stick to manure. I have thousands of worms—they have none. I planted 2 lbs. of onion sets, got 2 bushels of fine onions. One man planted 4 lbs. and put the chemical to them; I pulled mine to dry he pulled his and said what the Heck is this. He had them planted too deep in loose soil and had fed them so much chemical fertilizer that when he pulled them they were the same size as when he planted them. Mine averaged 3½ to 4 inches across. Every year I put in leaves, grass clippings, and two loads of horse manure and I plant all my seeds in sheep manure. I wish you could see my garden today May 7. Went out today and pulled radishes, picked off the first seed pods on my onions planted April 1. Will be picking spinach in a week and mustard greens this week. For "Organic Gardening I say Hurrah," for the chemical I make "I Say Fooee And I Mean Fooee—.

(Name Withheld)

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POISONS

May 8, 1947

Yesterday I had occasion to ponder sorrowfully our all too frequent resort to the use of deadly poisons. As I stepped upon my porch here lay what in minutes would be the dead body of my dearly loved little dog. Poisoned—definitely. How? Why ask! This is the second time within the year I have received punishment via this "Poisoning habit" we are so assiduously prosecuting. It may be difficult to interest people in the lowly earthworm but many have dogs, cats, birds etc.—plus their own bellies, which frequently experience strange tantrums. It is certainly time to direct critical attention to this wrong doing.

Harold C. Norton,
417 W. 9th St.,
Pueblo, Colo.

—o—

EARTHWORMS AND ROCKS

May 6, 1947

This story should be entitled "The Worm and I", or "One Year of Organic Gardening".

My place is the average house and lot, having been built during the last war on land formerly used for intensive production of vegetables with chemical fertilizers, also filled in with an extremely alkali dirt of doubtful origin. My first year at this place certainly showed poor results in attempts at gardening. About a year ago I became interested in "Earthworms", also entered my subscription to "Organic Gardening" at the same time. The combination of the two have been my constant companions since that time. The results obtained in the short time have been more than gratifying.

After receiving the first issue of "Organic Gardening", I threw away all chemical fertilizers and poison sprays. I also started my first compost pile. Upon arrival of the earthworms (I waited three months for them) I began an intensive breeding system, packing them in fruit lugs and caring for them in a 6 x 8 playhouse, which is affectionately known as "Wiggly

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Manor". Before long I had castings and compost to start using in the garden. As the earthworm population increased I gave them the job of turning the heaps in two pits. I know now that this is the best method of making compost and the easiest.

Reading Mr. Herbert .White's articles, and a visit to his home in Gardena, convinced me of the value of rock mulching. My young trees have been mulched since last September. I gave them loads of wormy compost and a dressing of oak leaf mold as a starter. I now have included a six inch dressing of alfalfa hay. My dwarf Meyer lemon is now three times the size of my neighbor's, which was larger than mine at time of planting. The frost got his apricot tree—mine is growing profusely. His peach tree has a half dozen fruit but mine is loaded. The mulching has attracted plenty of sowbugs and slugs, but so far there hasn't been any serious damage to any of my crops. I am using ashes around everything with hopes of discouraging them.

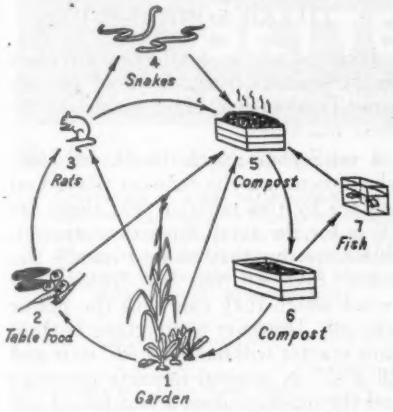
To make a long story short, this date finds my 20 x 20 garden loaded with strawberries, beets, turnips, lettuce, radishes, kale, carrots, tomatoes about two feet high, pepper plants doing nicely, sunflowers about four feet high, and in general everything doing beautifully. My fence is edged with boysenberries and youngberries. My concord grape vines, also the Thompson Seedless, are doing very well. The rest of the back yard includes the Apricot, Casablanca Peach, Dwarf Meyer Lemon, Plum, and Dwarf Lime.

I have used nothing but the "Worm and I" plus compost in my yard for a year now, and the soil and crops have improved to such a great extent that I am confident of the future in organic gardening.

Clarence F. Zieg,
6113 Pennswood Ave.,
Bellflower, California

LETTER FROM A YOUNG COMPOSTER

I have just started taking your wonderful magazine and wish to tell you that I agree with it one hundred per cent. I am a boy that has lived in the city all my life and have never worked on a farm, or much even walked on one. I do raise a garden each year and get much pleasure from it. I also like to raise animals but like all the other animal propagators I also



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1. Garden (tops and unwanted plants to No. 5), (Some to rats).
2. Table Food (Tops and unwanted parts to No. 5).
3. Rats (Table scraps to them).
4. Snakes (Excess rats to them).
5. Compost (Table scraps, rat and snake leftovers along with dead fish).
6. Compost (Worms working it over now, worms fed to fish).
7. Fish (Fed on worms and dead fish to No. 5, fish dead from old age).

run up against the ever present problem of feeding the animals. I have just figured out how to do this. I have a few snakes which I like very much, but no one else does. I raise white rats and mice for some of my boyish experiments and have 5 large aquariums full of tropical fish for more pleasure. The fish are fed on a small white earthworm called Enchytra. This worm never grows longer than an inch and is very white. I have had trouble in

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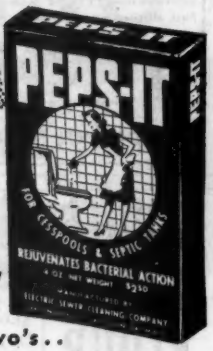

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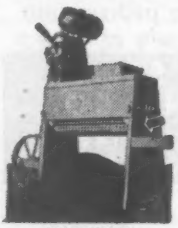
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keeping this worm going but after reading your magazine on earthworms I have had no trouble. My trouble was in that I fed them on the same thing and let their soil get sour. Here is a cycle in which every thing is worked out to let you see how I solve my feeding problem.

R. A. Marshall,
6991 Florence Blvd.,
Omaha 11, Nebraska

—o—

TILLER EQUIPMENT

Inclosed please find some circulars on the Seaman tiller. Some of you organic farmers may find good use for these machines.

I note your article in March issue which mentions the Seaman tiller. You will see by this circular that there are tillers for the small farmers at reasonable costs but they cannot handle the power take off nor go down eight inches which they can with the power take off. However a full three bottom plow tractor will handle a 42" unit and till 4"-5" in general farming purposes and the machine does a real job. I am using this machine on my farm and covering a green crop of clover grass with manure and milling it into the soil, and I know I will get results as when ground is pulverized in this manner it will absorb and retain more moisture and leaves a little mulch on the surface. If a good green crop with manure can improve my soil I figure it is cheaper than buying commercial fertilizer and easier to put in. As I have compost with earthworms to add to the ground I will have some good pasture for them and in this way I can build up my soil faster. Shall let you know the results after getting it worked out.

I am also building a concrete form for compost and will use earthworms on it and that method along with the above should bring very good results.

E. C. Nord,
Route 3,
Rice Lake, Wisconsin

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☐ No. 50 size, for 6 tons, at $9.95 each, frt. or exp. collect. ☐ FREE literature; ActivO and composting.

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Organic Matter Inhibits Plant Disease

AN intensely interesting booklet has been issued by the Connecticut Agricultural Experiment Station (Bulletin 500) dated November, 1946, called "Physiology of Fusarium Foot Rot of Squash," written by George A. Gries. It proves irrefutably that there *is* a definite connection between disease in the plant and organic matter in the soil. Here is a relatively new disease as far as Connecticut is concerned, and the first published matter about it appeared in 1939. Gries admits that it has become a serious local problem. In 1942, according to this booklet, Gries had shown that the by-products of rotting organic residues influenced the physiological functions of many parasites. It was this that led him to experiment along similar lines with the Fusarium Foot Rot of squash.

It seems that the disease entered Connecticut in contaminated seed. In fields where healthy and contaminated seeds were planted side by side only the latter developed the disease, which was caused by a fungus the spores or mycelium of which was present in the seed. To give a description of the disease, let me quote from the above-mentioned bulletin:

"The first symptom of the disease in the field is a wilting of the leaves of the host plant similar to the wilting due to the bacterial wilt disease or to that attending a heavy infestation of the vine borer. Within a very few days, and frequently within a matter of hours after the first wilting is noticed, the entire upper portion of the plant collapses. Upon close examination of the basal part of the stem, a soft, sometimes mushy, area may be distinguished even before there is any change in color. As the disease progresses, the infected area becomes first a light and then dark brown as the parenchymatous tissues become completely destroyed. About this stage it is not at all uncommon to see a whitish or pinkish mass of fruiting mycelium of the fungus both on the rotted regions of the stem and on the surrounding soil. As the rot progresses, undoubtedly aided in part by other saprophytic fungi and bacteria, the tissue becomes drier until finally only the fibrous anastomosing strands of the vascular system remain."

It was found that a hot water treatment of the seed, was sufficiently effective in curbing the disease, although this treatment did kill off some of the seed. Good results were obtained when the temperature of the water was kept at 60° C for 15 minutes. The results obtained were better than where the seeds were sterilized in bichloride of mercury, without the danger of toxic substances from the chemical being absorbed into the seed. In these experiments it was discovered further that diseased seed when two or more years old when planted do not produce diseased seedlings. A possible explanation is that the fungus infection may die out.

It was found also that by rotating crops, that is, even by growing squash only once in two years, no trouble was encountered due to the fact that the fungus did not survive the winter. It is advisable to have two-winter seasons between two crops of squash because if an unduly warm winter comes, the fungus organism may not die out.

I quote from the booklet regarding the most important part of the experiment:

"In the spring of 1943 naturally contaminated fine sandy loam, low in organic matter, was collected and divided into three portions. One portion was mixed with an equal volume of sand, one with an equal amount of well-composted squash vines, and one received no amendment. These three soil types were placed in screen-bottomed boxes 10" x 3" x 8" and buried to the surface level of the soil. Each box was given a "booster" inoculation of Fusarium spores. At intervals during the next two years, representative boxes were removed and taken to the greenhouse. There the soil was potted and planted with uncontaminated squash seed. Disease readings on the plants grown in these soils were indicative of the longevity of the fungus in the three soil mixtures. In the following Table is shown the presence of *Fusarium solani* f. *cucurbitae* in the field soil, humus-amended soil and sand-amended soil as determined by the incidence of foot rot over a period of two years following preparation of the soil types.

"It is especially interesting to note that the fungus did not persist as long in the humus-amended soil as it did in either of the other two soil types. Either of two theories might explain this behavior. First, the increased microbiological activity of saprophytic organisms might usurp the nitrogen supply and effectively starve the pathogene for this essential element. This is known to occur in the case of certain other soil-borne parasites. Soil analyses run on the various samples, however, refute this theory since they showed a higher available nitrogen content in the humus-amended soil than in either of the other two.

"The remaining theory advanced here to explain the relatively short existence of the foot rot Fusarium in the soil with a high organic matter content is that of antibiosis. Waksman and Horning (1943) and other authors have pointed out the omnipresence of soil organisms which produce antibiotic substances. It is quite probable that in the organic-amended soils, such organisms thrived and produced substances toxic to *F. solani* f. *cucurbitae*. In the field soil and sand-amended soil, the biological activity of such organisms must necessarily have been lower because of the limited nutritive conditions prevailing there.

"The results of this experiment coincide with several observations made on the survival of the foot rot fungus in soil and in organic compost. In one case, year-old compost originally containing diseased squash fruit and vines

TABLE 3. LONGEVITY OF *F. solani f. cucurbitae* IN THREE SOIL TYPES AS INDICATED BY THE ABILITY OF THE SOIL TO PRODUCE DISEASE ON HEALTHY SEEDLINGS

Two samples were used for each test

Date of test	Months from test initiation	Field soil	Sand-amended soil	Humus-amended soil
November, 1943	6	††	††	††
March, 1944	10	††	††	††
October, 1944	17	††	Not tested	00
April, 1945	23	††	††	00
August, 1945	27	0†	††	00

NOTES—The Plus Marks indicate that the Disease Organisms are still present.

failed to serve as inoculum when transferred to the greenhouse for experimental purposes. This observation lends support to the antibiosis theory since this compost had been prepared after established commercial procedures and thus always should have contained a sufficient supply of available nitrogen.

"In both of the cases mentioned above, when no natural infection occurred the next season after a heavy infestation of foot rot the preceding year, a heavy crop of rye had been turned under in the spring. This additional organic matter may have been responsible for the failure of the disease to develop."

I need not comment on these comments, because they coincide so neatly with dozens of statements in this magazine regarding the effects of a humus-packed soil on lowering the incidence of plant disease. We have been criticized time and again for making unscientific statements regarding this subject, that is, "unscientific" in the eyes and in the conception of super-trained scientists, who have built up iron-clad demands and formulae that have to be met before a theory will be acceptable to them. Well here is the scientific Connecticut Agricultural Station at New Haven that has done it scientifically.

We admire this Station. Their two investigators Lunt and Jacobson in 1944 demonstrated that yields of crops could be increased by earthworms. They made hundreds of analyses of field and forest soils that showed that the earthworms always left behind more nitrogen than the soils contained. The figures given are startling. If the top layer of the soil contained 4.7 nitrate nitrogen, the casts contained 21.9. These castings contained over ten times more available potassium than the soil and a tremendous increase in phosphorus.

It would be interesting if the Connecticut Experimental Station would continue its squash seed experiments to the extent of determining whether growing them in a soil enriched by compost would enable the squash plant to throw off the disease. If so, the compost should be made by the Sir Albert Howard method. Some Stations have experimented with compost made with chemical activators. That is not a satisfactory compost as far as organiculturists are concerned.

The idea that the liberal use of organic matter in a soil will effect a reduction in plant disease is not a new one. The agricultural literature contains a few references that bear out this concept. Here is an excerpt from The Country Gentleman of February, 1944 by J. Sidney Cates that gives another notable example:

"Little has been said about this new cure for root rot. Perhaps this is because the remedy, in its outward respects, is so very simple.

"The cure for root rot of cotton consists in nothing more than turning under leguminous organic matter in the fall or spring before the cotton crop is planted. A heavy dose of stable manure will affect the same end, though the latter is seldom available in sufficient volume to be a large factor under most root rot infested cotton-farm conditions. But this leguminous-organic-matter treatment of cotton soils has long been known to be highly profitable, even when no root rot is present.

"It is not through the chemical action of this rotting material that the cure is brought about. The answer lies in the fact that teeming bacteria in the soil, these bacteria no doubt embracing thousands of strains, take on renewed life under the stimulation of this, their seemingly pet food supply. Some of these stimulated bacteria strains are dread enemies of the root rot fungus. The bacteria not only destroy the fungus on contact, presumably as certain bacteria destroy our own body tissue, but the antipathy between these two organisms goes much further. In artificial-media cultures the root rot fungus dies even on the approach of the enemy bacteria growth.

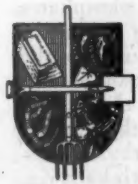
"The discovery leading to its control

comes from C. J. King, Superintendent of the U. S. Department of Agriculture field station at Sacaton, Arizona. King observed one summer in a section where alfalfa had been grown, and in another section where stable manure had been added, that there was little or no root rot damage while alongside, to the very sharp margin of where these treatments had been given, the cotton crop was almost devastated by root rot.

"But this new and successful root rot control method—that of altering the soil microbiology by feeding it with decaying leguminous material—is far bigger than the mere announcing of the abatement of a curse to Southwest cotton, devastating as the curse has been. *Fertility* is a chemist-proffered term. The word 'productivity' gives the realistic picture to the practical farmer. For years we have been twiddling over the proper proportion of NP and K and more recently over so-called trace elements, while the understanding of the broad phases of the soil-productivity mystery is not only confused, and unknown, but grossly neglected."

There is more than sufficient evidence that the use of strong chemical fertilizers and poison sprays are interfering with the healthy operation of the biological cycle in the soil, that the limiting ourselves to the use of well-made compost and other mild soil amendments will reduce disease.

J. I. RODALE



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The Living Soil

By DR. EHRENFRIED PFEIFFER

THE soil on which we walk and which we plow and cultivate for food is full of life. Not only is its mineral matter mixed with organic matter deriving from roots, decomposing animal and plant bodies, but there is a perpetual process of life going on performed by the plant and animal microbes in between the particles of the mineral matter. The maintenance of this life process is the chief concern of the organic gardener.

In fertile soil, for instance a good pasture or alfalfa field, one to two million earthworms per acre produce about 40,000 lbs. of neutral colloidal humus annually. To our readers it is a well-known fact that the earthworm castings are extremely rich in all nutriments, richer than the surrounding soil, especially in nitrates, phosphates and calcium. It is through the earthworm we know how to hunt up the hidden resources of the topsoil as well as of the deeper layers of the subsoil (down to 6 ft.) and make this storage available for plant growth. Earthworm castings also teem with bacteria.

Bacteria in their turn support the humus forming process. There are manifold species with many tasks. Some are helpful, some not. Nitrogen-fixing bacteria, for instance, are most beneficial, for they transform other nitrogen compounds and atmospheric nitrogen into nitrates, the most stabile form of nitrogen in the soil, humus or compost.

There are also nitrate and ammonia forming bacteria. These are less helpful for the stabile humification of organic matter. The nitrites and ammonia are unstable forms of protein and other organic decomposition and are eventually lost for the soil and for growing plants. However, they are the primary transformers of organic matter and, provided suitable conditions exist, prepare the path for the nitrogen-fixing bacteria. It is in the interest of the compost gardener to treat his compost and manure heaps properly and have them well set up and covered, for then more of the nitrate fixing life goes on and nitrites and ammonia are transformed before they evaporate or are washed out.

Besides the nitrogen cycle there are other bacteria which digest cellulose, lignine, i.e. cellular and woody plant matter and make these available for humus manufacturing. Others digest fecal matter. This in itself teems with life, its entire dry substance consisting of 20-30% of bacteria bodies. Think that one-fourth to one-third of the manure (dry) you are hauling out to the fields is bacteria.

Altogether in a fertile soil the amount of bacteria is estimated at about 500 lbs. per acre. Besides these there are thread bacteria or actinomycetes, a somewhat higher, highly variable form of microbic organisms somewhere between pure bacteria and a lower type of fungus life. These also digest organic matter. They grow slowly, prefer neutral soil, do not develop well with a calcium (lime) deficiency. Their main job begins after molds and the faster growing bacteria have done their work. They "clean up" organic "left-overs" and produce stabile forms of humus. Of actinomycetes there exist about 800 lbs. per acre of fertile soil.

Bacteria and actinomycetes prepare neutral or even slightly alkaline soil and compost (one important reason for putting lime into a compost heap,

the organic matter of leaves alone would be too acid and form only raw humus not stabile neutral humus).

In acid, wet, cold soils fungi and molds develop abundantly. If the soil or compost is too acid then they play first flute somewhat at the expense of the nitrogen cycle for their mycelium is less rich in nitrogen than the bacteria and actinomyces are. They develop also in loose material, straw, under aerobic conditions, for instance if a heap is not properly built up but refuse thrown about rather disorderly. They do not break down proteins. If alone and not followed by others a lot of nitrogen is lost. This may be one of the reasons why old fashioned "composting" produces a product poor in nitrogen and rather acid.

However, even the fungi and molds can be beneficial, if only followed by the erstwhile described forms. There are about 1200 lbs. of fungi and molds per acre of fertile soil.

Modern composting methods as emphasized by Organic Gardening and the biodynamic method are apt to maintain the proper fermentation. In addition there exist the smallest animal forms, protozoa, nematodae, etc.

Let us see our soil-life-equation:

The top layer of cultivated soil weighs per acre 2,500,000 lbs. These consist of mineral matter, organic matter, water and air.

The average organic matter content of good soil is about 2-5%, i.e. 50,000 lbs. to 125,000 lbs. per acre is total organic matter. Of these one part is dead or more or less undigested material, that is in unstable form. Only a small part is present in real stabile humus form. Only neutral colloidal humus is stabile and not exposed to losses or washing out. Only this humus has a high absorbing power.

of the total humus are rendered by the microbic life of the soil.

As compared with this activity the amount of manure applied seems small. Manure consists of 75% water, of which only 25% is pure mineral and organic matter. The common application of manure by farmers is ten tons per acre, gardeners sometimes use more, if available. These ten tons (20,000 lbs.) of manure contain only 5,000 lbs. mineral and organic matter. Experts who have studied this subject recently estimated that maybe only 1,000 lbs. of this matter per acre is made available for plant life and that the major deficiency of our soils therefore, as paradoxical as it sounds, is a humus deficiency of the soil and not a mineral deficiency. For in ten tons of manure all the minerals are contained which one acre needs.

Manure, even at a rate of 10 tons per acre adds, in the end, only about 0.02% to 0.03% to the humus content of the soil. Throughout the world and through the ages man has constantly created therefore a humus deficiency and this to a much greater extent than any mineral deficiency. This organic deficiency lies at the bottom of all soil, erosion or dust storm troubles.

Manure and compost alone would not be able to balance ever this deficiency were it not for the soil life itself. Only this can balance our soil and make it self-sufficient. Manure and compost, however, are food for bacteria, actinomycetes and fungi. It provides them with just the right composition of organic matter on which they can live and thrive as they would on a skillfully prepared nutritive broth in the laboratory. Decaying plants provide minerals and vitamins besides; animal excreta the hormones, a well treated compost or manure heap,

To sum up:—Earthworm humus	40,000	lbs. per acre
Fungi	1,200	lbs. per acre
Actinomycetes	800	lbs. per acre
Bacteria	500	lbs. per acre
Protozoa	2,500	lbs per acre
	45,000	lbs. per acre

therefore, is the ideal culture medium for stimulating the stabile humus forming process in the soil.

Carelessness in their manufacture as well as in applying them, for instance, spreading out and letting lie about for weeks before plowing and digging under, or letting a heap get dry and inactive—all this means losing the true wealth of the soil. What we actually do is: that we nourish the organic life and this in turn feeds the living soil ten to a hundred times as much as we do.

Nitrogen-fixing bacteria are only contained in fertile top soil. Since these are to finish up the job, it is so very important to inter-layer or at least to cover a heap with good soil and not to have it on concrete or the poorest spot of the garden. The shadow of shrubs, trees, etc. is also beneficial, because in summer time it protects the heaps, keeping them more moist and cooler which also helps to extend the bacteria action. It would be best to re-inoculate each new heap with a layer of the very best part of the old heap for the same reason.

The most outstanding research about stabile and instabile humus and manure has probably been done by the Polish professor Niklewski, the Dutch professor Hudig (Agricultural College Wageningen) and the Dutch State Agricultural Consultant J. O. Cleveringa. The research of these men proves that fresh manure loses quite a bit of nitrogen and phosphates when plowed under directly, while composted manure has a better and higher proportion of nitrogen, carbon and phosphates. Ten tons of fresh manure, with regard to stabile forms of humus in field experiments, are equivalent to three tons of composted manure, according to Cleveringa. In a small brochure "The Value of Organic Manure for the retaining of the Fertility of cultivated Soils" (obtainable only in Dutch, but one of the outstanding publications for the organic cause) he reports:—"The organic anaerob prefermentation of manure (i.e. composted manure, the heap being covered with earth) has a much better value for the forming of a crumbly structure of soil than fresh manure . . . . With an aerobic fermentation (i.e. loose, scattered manure) the break down process can go too far, so that the break down products cannot be used for new upbuilding processes to form stabile products". In his experiments Cleveringa proves that increase of weeds, fungus diseases on roots, the lodging of grain with much rainfall are direct results of improper fermentation of organic matter. "These evils are exclusively influenced by the organic factor". Through the formation of calcium hydrocarbonate together with humus a stabile form is obtained. "These processes, he says, act dynamically and organic manure cannot be replaced by anything else. Mineral (commercial) fertilizer does not produce organic bodies nor the carbon dioxide which is needed for the calcium (lime) mobilization".

Live bacteria have a relationship of carbon to nitrogen 5 to 1, whilst molds have only 10 to 1. The proportion 5 to 1 forms stabile humus and binds all nitrogen. The growth of bacteria is determined by this relationship, particularly with the possibility of absorbing nitrogen from the surroundings. "It is therefore", Cleveringa continues, "that the C : N proportion has to be regulated consciously with the (composting) manure treatment. We have to reckon with the behavior of the bacteria, which are more powerful than plants in this regard and which can help the plants if directed in the proper way". Moldy manure or compost contains less fixed nitrogen (straw for inst. 70 : 1), acts too slowly and loses out in the long run. If the manure or compost is kept too wet then there is the danger that only butyric acid bacteria survive which render all other humus forming bacteria worthless (creating too high an acidity).

In fresh strawy manure the proportion of carbon to nitrogen is 23 : 1 (too high); in well mixed, composted manure the proportion of carbon to ni-

trogen is 19 : 1; in stabile humus, in soil the proportion of carbon to nitrogen is 11 : 1 or 12 : 1 which is considered best for humus. All composting treatment, mixtures of straw, manure, weeds, other kinds of litter have to approach this proportion in order to produce the most successful product.

The following figures are taken from the brochure of Cleveringa. They prove best the importance of composting manure. They are based on 8 years of experimentation by a Dutch state experimental station. Yield of experimental fields, the treated manure lot set equal to 100%:

	1932	1933	1934	1935	1936	1937	1938	1939
Crop	Potatoes	oats	rye	mangles	clover	hay	barley	potatoes
Manure	100	100	100	100	100	100	100	100
Chili nitrate	78	98	97	83	86	100	90	94
Sulfate of Ammonia	90	95	73	72	87	83	90	76

These yields were obtained on lots with sufficient lime.

On fields poor in lime the yields were:

Manure	100	100	100	100	100	100	100	100
Chili nitrate	76	86	90	78	—	91	—	87
Sulfate of Ammonia	87	83	70	87	90	92	93	76

When this writer visited the Dutch Experimental Station before the War he was shown a tract of pasture land treated in lots with fresh manure, composted manure and several types of commercial fertilizers. Each lot was fenced in and sheep put in to pasture. The sheep grazed first, after sampling here and there, on the composted manure lot, then on the other manure, then on the limed one, then they started to get restless and finally jumped the fence before they touched the sulfate of ammonia lot. The manure lots were clean cut out of the rest of the lots. It seems sheep know better than agriculturists, an observation one can make with other farm animals too.

Prof. Niklewski, of the University of Poznan (Poland), of whom we have not heard since the German occupation, defends the case of neutral colloidal humus which can only be obtained, or rather maintained, by proper methods of composting manure as well as organic waste. The neutral reaction is most favorable to the development of humus forming bacteria and actinomycetes. The colloidal structure of humus adds to the absorptive power of the humus and soil. Minerals in solution, nitrates, lime are kept in a state where they are not washed out and lost. A neutral colloidal humus, therefore, can absorb two and a half times its own weight in water. This is a most important factor in order to keep the soil crumbly and to retain its moisture for a larger period extending into a drought, as well as to absorb a heavy rainfall and counteract erosion. As a matter of fact the famous black virgin prairie soil of Russia or the Middle West is richest in that neutral colloidal humus to which it owes its fertility.

Garden soils which are better cultivated and more frequently provided with compost have here the advantage over farms, therefore showing better humus structure and less erosion. But it is to be hoped that the example set by the organic gardener will sooner or later also spread to the farmer and teach him the importance of humus preserving methods. Nature itself has set the best example with virgin soils.

TOMATOES

April 30, 1947

I used compost on my tomatoes last summer and did not have any dry rot. I also watered them thru the dry weather May 20 to Aug. 16, and sure had lots of beautiful tomatoes.

Mrs. Mable A. Lyon,
R. 1, Greenville, Mich.

—o—

WORMS AND POTATOES

April 11, 1947

In my garden this year I have a row and a half of Irish Potatoes that were planted in a furrow that was first opened by a plow; a shallow pad of wet, partly decayed oak leaves, crawling with thousands of earthworms was piled on top of the seed, (cut to two eyes). These are attracting much attention, being of deepest green color, and even the leaves being almost twice as large as well fertilized rows next to them, in which good cowlot manure only was used.

R. A. Caldwell,
Barwick, Ga.

—o—

THOUSANDS OF YARDS

December 11, 1946

You should see my composting program. I now have 7500 cu. yds. of excellent top soil stock piled for future use, and hundreds of cu. yds. in the process of maturing. I just wish I had time to write you at length of the astounding results we continue to have in our landscaping nursery and greenhouse operations.

Paul Pfund,
Lake Street,
Elmhurst, Illinois

TEXTURE IMPROVED

December 16, 1946

Perhaps you would like to hear what organic methods have done for our garden. It was very heavy clay, and lay low. By tile draining we have helped the excess water situation and by the use of compost made with chicken manure the texture has been amazingly improved. We spread the good word wherever possible and people came to see our compost heaps and so the circle widens.

Mrs. John E. Butler,
365 Maple Ave.,
Danville, Ky.

—o—

SOIL EASILY WORKED

December 12, 1946

Have used six piles since spring. Heaps are approximately 6 x 8 or 10. Last one is larger as it has to lay till spring.

Needless to say the garden and shrubs are a pleasure to work in and look at. A child could spade the plot where the first compost was spread.

Wm. Scheffler,
Aurora, Ill.

—o—

YOU SEE IT RIGHT AWAY

Feb. 25, 1947

Last year I made about half an acre of garden on a portion of the Ranch which had been used for many years before we came here. I had some compost to use, but not enough for all, so had the first opportunity to see the difference it makes.

Mrs. C. M. Smith,
Jubilee Ranch,
Llano, Calif.

PAPAYAS, TOO!

Papaya in the yard of *Fred Anderson,* R. R. 3, Box 335, Sarasota, Fla. This tree bore 250 fruits and was raised the organic way. "The papayas weighed from 2 to 7 pounds and were the sweetest I have ever raised."

—o—

GARDEN CLUB RESULTS

During the last four years, I have made many compost heaps both good and bad according to weather conditions and available pitchfork power, but no matter how good or bad they were, I have stood out bravely against even a flip of chemical fertilizer to boost a pea vine. Consequently, the hard surface crust which used to frustrate me by getting harder year by year has now become rich and friable soil which defies drought and encourages growth.

Last summer, scarcely a bean beetle, corn borer or squash borer was to be seen—not a brown spot on a tomato despite the fact that tomato blight nearly ruined every crop in the vicinity. Even though the garden space was reduced by half, there were more vegetables of better flavor, than ever before. The plants required less watering, bore longer and withstood frost better. Also the rabbits liked them better.

Today with a practical experience of success in organic methods of gardening I am glad that I believed in the printed word of *Sir Albert Howard, Ehrenfried Pfeiffer, Eve Balfour* and *J. I. Rodale* when they hurled words of anathema against chemical stimulants and extolled the virtues of organic manures. In their fight to recover health for the land, for the crops and for the people, from now on I shall engage, using the weapons near at hand that Nature has provided, while shouting their battle cry which is—HUMUS.

Mrs. Robert Scott Spilman,
Kanawha Garden Club,
Bulletin of The Garden Club of America, March 1947

—o—

NATURAL APPROACHES

March 21, 1947

I have 2 acres and am trying so much that which I read in your magazine—it sounds good to me, and some of it I have proven. Much of it takes time so in another year or two I may be so enthusiastic I'll be recommending you for the Congressional Medal or something.

There have been *no* chemicals fed or sprayed on my place for 4 years—we have very little insect or disease trouble. Not a potato bug last year. The year before they got on 7 plants for about 8 days—did little damage and then disappeared. Perhaps birds ate them.

Those cobwebs that form in trees enclosing caterpillars appeared in two apple trees. I refused to spray—and at 3 different times I saw Blue Jays and Goldfinches up there eliminating them. They didn't spread.

Those are the 2 biggest thrills Organic Gardening provided me.

Irvin J. Blakeman,
Pine St.,
Perrysburg, Ohio

Clewell

Iris Surprises In The Fall

By MELVIN G. GEISER
Iris Grower, Fair Chance Farm, Beloit, Kansas

DO you want unusual iris to bloom with your Chrysanthemums, Dahlias and other late fall flowers? It is now possible due to the efforts of the iris hybridizers who in the recent years have, rubbed Aladdin's lamp as it were, produced a complete strain of re-blooming Iris. In no other flower will you find the rainbow coloring as you do in these fall blooming Iris.

"What skillful limner e'er would choose
To paint the rainbow's varying hues,
Unless to mortal it were given
To dip his brush in dyes of heaven?"
—Scott; Idyls of the King

For cut flowers they are unsurpassed if one selects the bloom stalks just as the plump buds are beginning to open. By cutting the stalk with a long diagonal cut and by changing water once a day these flowers will last until the last bud on the candelabra stalks have bloomed.

But one is sure to ask—"Are these iris as easy to raise as other iris?" The answer to that is definitely—"Yes". Plant as other Bearded Iris but preferably on a south sunny exposure in order to force into bloom earlier in the spring. These iris will not perform well in either partial or full shade. Let the plants rest a month after blooming, then water heavily to force second crop of bloom—repeat until fall. In as much as these iris are gross feeders, fertilize with one-half inch soil covering of well rotted barnyard manure or compost (do not use commercial fertilizers as they have a tendency to burn the roots and frequently cause rot) and work well into the soil. I have had the charming 12 inch *Jean Siret* (a French variety) bloom four different times one year with above treatment. Incidentally *Jean Siret* is probably the most reliable of all re-bloomers and well that it is too, for as a border its perky yellow bloom with flecks of hyssop violet on the falls create a lively picture indeed.

But what about the other re-bloomers? H. M. Hill of Kansas, Mr. Lapham of Indiana, the Sass Brothers of Nebraska and other hybridizers have been working to develop these unusual performers. Iris developed here in the mid-West have proven themselves hardy anywhere and, in addition, they are thoroughly tested for re-blooming qualities by our early frosts. But unlike many varieties of chrysanthemums, the iris varieties listed in most iris growers catalogs as Fall or Re-Blooming are just that and rarely does one miss some bloom even though winter does come early. This cold frosty December day, as I am writing this article, I went out into my garden and picked a bloom stalk of *Sangreal* with one bloom opened and two lovely plump side buds. *Sangreal* is a 28 inch variety hybridized by Jacob Sass. It first blooms very early in the spring just after the small Easter iris (*pumilla atroviolacea*) is through blooming. But here it is for the third time this year, blooming. It is a light clear yellow self with a deep orange beard slightly ruffled and frilled. The styles are rich ivory. Planted with any dark colored dahlias, the garden is really highlighted.

One of the finest ultramarine blues is *Ultra*, another Sass variety with 2 to 3 blooms to a stem. This variety has a very heavy substance and is of rapid increase. Plant *Ultra* with *Southland*, a deep golden yellow of very heavy substance. Incidentally this latter variety won the American Iris Society Award of Merit in 1939 and is still one of the best.

For a splash and dash of red, there is *October Blaze*—an increasingly popular sort which this year had as many as 9 blooms on its 36 inch stalks. This variety is from Clint McDade of Tennessee and sometimes is described

as a deep dancing red with violet undertones and glittering gold beard.

To relieve the somber tones of any fall garden planting there is the group of white iris, namely *Frost Queen* and *White Autumn Queen.* These two are very similar in growth and frosty white in color, however, the latter is slightly larger and has ruffled petals with yellow veining at the haft on the falls. Another good white is *Autumn Frost* (from Schreiner in Minnesota) which is fragrant and has an alabaster whiteness with wax like substance.

During the recent years many hybridizers have been trying for a true "pink" iris. Although the fall blooming group does not boast as "pink" a representative as the regular group of May flowering iris, however, there is one, *Autumn Dawn* (from Nies in California) which is usually described as a ruffled soft pink and smooth yellow blend running into a pinkish apricot coloring rather than a true bright pink. In the higher priced and more recent introductions is *Autumn Sunset,* a large blended pink or smoky old rose with ivory styles, growing 32 inches tall. It also is fragrant.

Another charming setting can be secured by having a mixed border of *Olive White* and *Bountiful Blue*—two varieties both reliable and of coloring indicated by their respective names. For the low front border or edging a cement walk I have used *Autumn Queen* (a charming 15 inch white) mixed with the French variety *Lieutenant de Chavagnac,* the 10 inch violet-bronze-cream combination. This latter variety rarely has more than one bloom per stem but is very prolific.

For your dark "black as pitch" iris, there is *Black Magic* in an intense deep blue-violet with velvety lustre and blackish sheen. Just slightly lighter is *Eleanor Roosevelt,* the 26 inch Award of Merit winner, in flourite purple with blue tipped beard and a slight fragrance. *September Skies* runs into the violet purple but the branching is rather crowded, however, it is one of the most reliable bloomers.

For an immense lovely uniform blue self well branched (11 buds on one stalk picked this year) try *Martie Everest,* a 36 inch variety. Although rather scarce, it is worth waiting for. If you have a hankering after a peaches and cream-like combination, there is *Autumn Elf* and for a dash of burgundy red thrown in, try *October Opera.* Palest cream is represented by *Surefire,* an offspring of the dwarf Yellow Bird and the fall blooming Autumn King. Copper colored iris in the fall are rare, however Mr. Hill has given us *Kansas Ingleside,* a large warm toned red self with coppery sheen and tan styles. This latter sort is very free blooming having bloomed 3 or more times in one year.

Tucked away in its foliage, one is often surprised by the immense blooms produced by *Golden Harvest,* an olive or citron yellow with pronounced brown veinings. The entire flower has a definite frosty sheen with a greenish yellow haft. *Polar King* leads us to perhaps one of the most unusual colorings in the iris family. This variety is rather tempermental in blooming but its white coloring flushed with a pale greenish cast really makes the visitors to your garden stop and gasp.

Along the color lines of *Tiffany* or *Siegfried* we find the comparatively new *Gladsong,* a yellow ground plicata with Tiffany blood. This appears to be one of our most promising newer fall sorts. Also a fine new red, *Priority,* will soon be appearing in the growers' catalogs, watch for it.

The possibilities of using these iris in landscaping are unlimited. Use an evergreen hedge or specimen evergreen trees as a background with the latecomer *Autumn Flame,* a deep toned red bicolor of heavy substance, planted among a medium tall white chrysanthemum. In front of that Boston Ivy covered wall plant *Peggy Babbington,* a wax-like clear yellow, or *Golden Cataract,* a golden yellow cascading into deep gold, mixed with *Dorcas Hutcheson* or *September Skies* both violet purple in color.

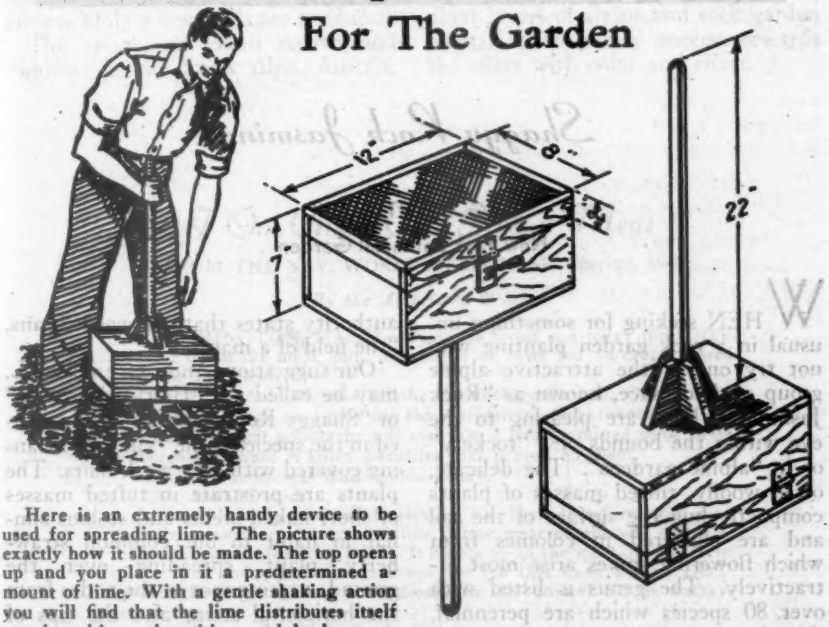
Another good arrangement is to scatter *Autumn Queen* and *Lieutenant de Chavagnac* (both described above) in crevices of the rock garden among

the sedum. *May Night,* a tiny blackish purple dwarf, can also be used here but a word of caution on these dwarfs in the rock garden. Locate the plants in well drained crevices so that water will not stand around the roots for any length of time—they are very sensitive to wet rot with wet feet and no sun.

Two charming dwarfs not regular fall bloomers are *Neola,* a livid violet shading to sorghum brown, and *Stewart,* a very dainty and small intense gold yellow nestled among its green leaves. Perhaps in the not too far future some irisarian may develop a reliable re-blooming strain from these two varieties.

But what about the prices on these fall blooming iris? Actually they run in the same price range as any of the dwarfs or tall bearded sorts which bloom during the usual blooming season. Specific prices range from 20c up to $5.00 per rhizome for the newer novelties. So why not try to lengthen your flower season and grow something new and different. They are so easy to grow—just divide frequently and water well after giving them a period of rest. Bloom 3 or more times a year will be yours for only a little added effort.

Miniature Lime Spreader For The Garden



Here is an extremely handy device to be used for spreading lime. The picture shows exactly how it should be made. The top opens up and you place in it a predetermined amount of lime. With a gentle shaking action you will find that the lime distributes itself evenly without depositing unduly large amounts in one spot. Ordinary mosquito screening provides a good means for permitting the lime to be shaken through conveniently.

We used to take a bunch of lime in our hands and distribute it but we found that some of it came off in cakes, also it go into our clothes, hair and mouth. With this device you can keep it away from the above-mentioned places.

This device is the idea of J. I. Rodale who is not applying for a patent on the idea. Anyone is permitted to make it, either for himself or for sale to others. Will some enterprising company commercialize this item? It looks as if there is a need for it. S.S.

Shaggy Rock Jasmine

By G. L. WITTROCK
New York Botanical Garden

WHEN seeking for something unusual in a rock garden planting why not try one of the attractive alpine group of Androsace, known as "Rock Jasmine". They are pleasing to the eye within the bounds of a "rockery" or in "alpine gardens". The delicate, often woolly, tufted masses of plants compactly hug the surface of the soil and are clustered in colonies from which flowering spikes arise most attractively. The genus is listed with over 80 species which are perennial, though some are biennial and annual, bearing flowers in shades of white and red suggesting miniature Primroses, in fact, the genus is a member of the Primrose family. The genus name, Androsace, is an old Greek word with no apparent significance, though one authority states that the word means, "the field of a man".

Our suggestion, Androsace villosa L. may be called the "Hairy Androsace" or "Shaggy Rock Jasmine" as described in the species name "villosa", meaning covered with long weak hairs. The plants are prostrate in tufted masses of short naked stems and stolons similar in habit to our common strawberry plant, spreading over the ground, striking root at the nodes from the horizontal stems and the tips of the stolons, thus forming tufted masses at close intervals. The individual plant is no more than one inch high consisting of a compact rosette of very woolly basal leaves, each leaf being stalkless, very linear and the whole rosette measuring only one half to one inch wide

and high; they have a slight and not unpleasant acid taste. This carpet of plants is an attraction throughout the season, the woolly and shaggy character always being conspicuous in spite of the delicate, comparatively miniature form of the plant colonies.

From the basal leaves a solitary floral stem often arises usually from one-half to 2 inches high. It is brown to reddish in color and is slightly hairy. This stem or scape, as it is often called, bears a flat-topped cluster of flowers, below which there is a whorl of 5 to 7 green leaf-like bracts, each bract being similar in shape to the basal leaves, though much smaller. The flowers within the umbel are one third of an inch across, white or rose in color with a yellowish-red ring in the throat. Each involucre head or umbel bears from 2 to 6 flowers, though one-flowered varieties are known. Only a few seeds are produced.

The species is found native and common in the Swiss Alps, Austria, the Caucasus, Afghanistan, Asia Minor, India and western Tibet at altitudes from 12,000 to 17,000 feet. The species was introduced into cultivation as an alpine plant in 1768 by Prof. de Sauffure.

The plants are hardy in respect to cold and thrive well in limestone soil; the soil must be well drained. They do not tolerate hot summer sun and thus must be planted so that they are in partial shade during the summer months and assured free air circulation, watering frequently in dry summer months.

The plants are readily propagated by root division, seeds and by cuttings. This charming alpine plant is most suitable for a northern aspect of a steep rockery. It is not generally recommended because of its difficult culture, but this should be a challenge to plant lovers of alpine and rock garden plants. Even partial success rewards the effort with color and effect.

DDT On Crops Can Poison Meat

FROM THE N. Y. WORLD TELEGRAM—May 23, 1947

By the Associated Press.

WASHINGTON, May 23.—Congress found out today that DDT showed up in the meat, milk and butter of cows fed on crops dusted with the insecticide.

Dr. P. N. Annand, chief of the Entomology Bureau, also testified at House hearings on funds for the Agriculture Department that too much DDT might poison the soil and that it had permitted some pests to increase because it killed parasites that preyed on them.

The testimony was made public today.

Dr. Annand said:

"In addition to the soil hazard, it has been found recently that there is a considerable accumulation in the meat of animals that are fed on forage dusted with DDT. It builds up in the meat, particularly in the fats, and where forage crops are fed that have a high DDT residue the amount that accumulates in the animal fat is rather astounding."

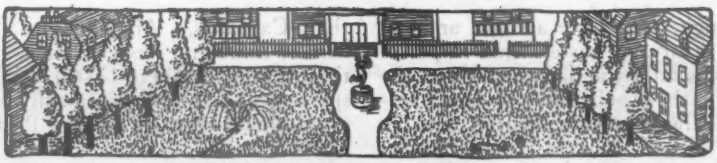
Rep. Everett M. Dirksen (R., Ill.) inquired:

"Is its toxicity destroyed by preparing over a fire?"

"It comes through just as toxic as when it is fresh," Dr. Annand replied.

He said there was more concern over secretion of DDT in milk, because it concentrates in the butterfat, so that butter might have fairly high quantities.

The department, he said, was not recommending DDT for forage crops to be fed to milk cows.



Garden Calendar — July

NORTH TEMPERATE ZONE: *Vegetable* plants can be set out in most places, especially broccoli, Brussels sprouts, late cabbage, cauliflower. You may sow Chinese cabbage, endive, kale, peas, and late beets. The time for late potatoes is about past by the first week of the month. This describes Delaware conditions. In Oregon, bush beans are planted till July 15, fall peas from July 15.

Succession crops of radish, leaf and head lettuce (sown into the open and thinned later), turnips, spinach are indicated. In North Dakota, for example, the date for winter radish is usually July 4.

Storage crops—you may store turnips, winter radish (either Spanish Black or large White), rutabagas, endive, carrots, cabbage, cauliflower, red cabbage in a cool cellar for several months, and thus avail yourself of fresh unpreserved winter food from your own organic growth.

Flower gardening allows especially the making of cuttings from ripening wood. Be careful not to propagate patented roses, but make others, taking the cut a little below a node or joint or rather eye. Keep shaded and moist, but do so by sinking most of the cutting into the ground.

Preserve flower seeds of special varieties, do not force Delphiniums into too much bloom by cutting out stems too forcibly.

Summer *pruning* of fruit trees rather well established does away with the thinning problem, yet produces none of the useless water sprouts. The strength of the tree will be used by the ripening fruit.

THE SOUTHERN GARDEN: In Alabama, they transplant Rutgers tomatoes by the middle of the month; in Southern California, beets, broccoli, carrot, cauliflower, corn, endive, lettuce, peppers, radish, tomatoes, turnips are sown or planted. In Southern Georgia, celery plants, pole and lima beans; in Virginia, bush beans, beets, broccoli, late cabbage, carrots, cauliflower, celery, Chinese cabbage, collards, corn, leaf lettuce, rutabaga, tomato may be sown or planted.

Prune *shrubs* that get going too rapidly, cut *tree branches* that have been bothering you NOW. Consider the nesting needs of birds before you cement up all holes in old trees. Water *glads,* they thrive on it. Make succession sowings of zinnia, cosmos, portulaca.

Lawns can be spoiled by too many sprinklings. Grasses normally go into their summer rest period, so do not force them to make extensive growth which then you will only have to mow off frequently.

In frost-free areas, take out *tulips* and store them for at least ten days in a moderately cold ice-box and expose them at least to one or two good freezings. To put them in a box, filled with barely moist sand and to freeze the package solid is sound practice. Then you will get tulip flowers again next year. Other *bulbs* may be rested now as their rest period has arrived.

Candytuft Cummings

Candytuft For Beds and Borders

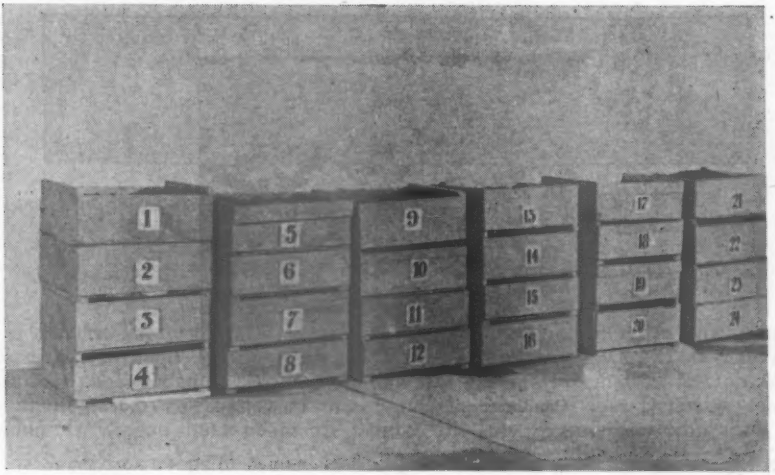
By M. B. CUMMINGS
Professor, University of Vermont

CANDYTUFT, genus Iberis, is well adapted to any place in the garden where the soil is good and the sun may shine on the plants. It has a long flowering season; in fact, there are but few hardy perennials that afford a more prolonged flowering period than this one, lasting a month or more.

Experience shows that Iberis does best if seeds are sown outdoors where it is to grow in April or May; and when the plants are well up, thin them to the desired distance apart. Seeds may also be sown in July for fall flowers. For cut flower production it is best to have the plants about one foot asunder. Candytuft can be grown in pots for window decoration, three plants to a pot.

Candytuft is very fragrant, resembling the sweet alyssum in this respect. It is most useful as a border plant or for edging, but gives a fine effect if sown in sizeable beds for mass effect in color and form. It is also good in the rock garden. The Giant white variety has been much improved through selection and has flowers of good size borne in large trusses dispersed well above the leaves. Candytuft is sweet, it is beautiful and is worth its space in any garden and generally is quite satisfactory. The Tenore species, Iberis tenoreana from Italy, is shown in the picture taken at the Arnold Arboretum.

Iberis is from Iberia in Spain, the native home of candytuft. Iberis sempervirium is a good edging species which is evergreen with white flowers in raceme-like heads. Iberis umbellata, the Globe candytuft, is an annual eighteen inches tall and has several color varieties of pink, violet and red. The perennial species Iberis semperviens, is low growing and compact, somewhat woody at the base with white flowers that become lilac with age. Iberis amara, the Rocket candytuft, is a small hairy annual with large fragrant flowers.



Raising worms in the cellar in grape boxes.

Is The Earthworm The Organic Gardener's Friend?

By L. H. JOHNSON

THIS question seems to be gaining more and more publicity as time goes on. Ever since the day of Chas. Darwin, when the value of the earthworm to our economic life was first estimated, there have been rounds of arguments between the Scientists and Farmers. Some farmers claim he's good for crops and are "preaching the gospel of the earthworm". Scientists argue that he has wiggled into too much publicity as a crop aid and are "cold" and antagonistic to this idea.

On December 26th, 1946 at a meeting in Boston of the American Association of Advancement of Science, this battle report was brought up by two men of the U. S. Soil Conservation Service, Henry Hopp and Homer T. Hopkins. Apparently they didn't take sides, but reported that the earthworm has been "extolled as a soil builder" in recent articles in national magazines and that someone is writing a book titled "Earthworm Farming". Dr. Hopp is already on record *for* the earthworm on which he published an extremely fine article (*Organic Gardening*, Oct. 1946)—Can this question be settled in a convincing logical way, one way or another?

I feel therefore, that it is for those who have had experience and knowledge of the subject to defend which ever side they choose. It is for this reason that I would like to add my experience in support of the earthworm. I feel that the "proof of the pudding is in the eating" and when I see results in front of my eyes, science or no science,

I am in favor of whatever it was that produced satisfactory results.

Six years ago I came across a magazine ad that offered for sale a new breed of earthworm. At first I thought someone had found a worm that would guarantee to catch more fish. Not so! It was a new breed that had been developed to increase soil fertility. This intrigued me, as I have always had an "eye" for anything new that would improve the soil economically. Could worms do it?—I wondered. I knew that Chas. Darwin, many years ago, unearthed a lot of facts concerning the earthworm and what it could accomplish in the way of soil aeration, an improver of the soil and a general aid to the growth of plants. Now what did these worms have that Darwin's didn't? Upon further investigation I learned that a practicing physician in Texas decided to go further with this worm matter than Darwin.

There have always been certain objections by a lot of people to having too many earthworms in the soil of their gardens and lawns, as I have often found when treating lawns and golf courses. A greenskeeper friend of mine used to get out early in the morning with a long whip-like bamboo pole and go over the putting green to destroy all worm-casting mounds which might cause an ardent golfer to lose his temper or a shot under par. Now for one thing, this new breed of worms is supposed to deposit their castings in their ground channels and not on the surface of the soil. That alone seemed good news to me. On further investigation, I also learned that they were prolific breeders—more so than the common earthworm.

That ad was successful so far as I was concerned. It attracted my attention, aroused my curiosity and got my name on the dotted line.

In a few days I received a small box that contained so-called mature breeders, egg capsules and culture, together with instruction on how to proceed raising earthworms indoors. It seemed too simple to be true. All I did was to secure a few boxes that had been used for shipping grapes, bored a half dozen holes in the bottom, over which I placed a doubled square of burlap, filled the box with a mixture of garden soil, rotted manure, peat moss and some cornmeal. After wetting this mixture well I placed the contents of the box containing the worms equally among these three boxes, covered with wet burlap and set in a dark corner in the basement.

For the following several months I would add table scraps a couple of times a week that consisted of most everything but rinds of citrus fruits. I noticed that melon rinds were particularly relished by the worms as was anything containing fats and sugars. Since soil moisture is very important in the raising of worms, I kept them watered about once a week.

When the ground became workable in the early Spring, I dug a pit about six feet long, three feet wide and two feet deep at the edge of the garden and in the shade of a large spruce tree. This was filled with alternate layers of garden soil, manure and humus from the compost pile. When I dumped the contents of the worm boxes into the pit, I found to my surprise that each box contained hundreds of worms ranging from small thread-like young ones to adults three inches long.

After about six months in the pit, I figured that I had sufficient worms to do some experimenting of my own. I had some garden and flower seed and they were ready for transplanting, so I selected two spinach plants as near the same size as possible and placed them in 4" pots containing good garden soil. To one I added about fifteen adult worms and the other was used as a check. Within a very short time I could notice a little difference in the leaf coloring, and at the end of three weeks the plant having the benefit of the worms was almost twice the size of the other.

I then decided to see what benefit could be derived from the soil that had passed through the digestive

Starting the test: Spinach plants in pots, the left pot has soil with worms, the right pot ordinary garden soil.

Results: The same Spinach after three weeks.

tracts of the worm, so I placed two cabbage plants of equal size in three inch pots, one containing worm casts, the other ordinary garden soil. In about two weeks the plant in the worm casts was several times the size of the check plant.

I was interested in learning just what it was that was responsible for the difference in growth, so I sent samples of both types of soil to the Agricultural Department of Penn State College for analysis. The report as shown here tells its own story. I was particularly interested in the considerable increase of permeability (the ability to absorb water quickly) of the soil containing the worm castings. It seems to me that this alone would prove of sufficient value to the farmer to warrant their existence in the soil.

Lab. Nos. 9355-9356

July 10, 1944

Mr. Leonard H. Johnson
Landisville, Pennsylvania

Dear Mr. Johnson:

This concerns the two samples of soil about which we have had some correspondence. Sample #1 is supposed to have passed through an earth worm, consists of earthworm casts. Sample #2 is supposed to fairly represent the original soil which has not passed through the earthworm.

If both of these samples were carefully taken it is quite clear from our analysis that the earthworm casts are both physically and nutritionally superior to the ordinary soil. This is revealed by the following figures:

	No. 1 (casts)	No. 2 (Original soil)
Nitrogen	1000 # per A.	140 # per A.
Phosphorus	40	20
Potash	900	330
Calcium	7000	2800
Magnesium	700	120
Aluminum	T	T
pH	7.6	7.5
Lime Required	—	—
Organic Matter	4.6	3.2
Probable Permeability	69.3	26.7

It is very clear from the above analysis that both samples are neutral and well supplied with organic matter, No. 1 being better supplied than No. 2 The available nutrients are considerably higher in No. 1 than in No. 2. No. 1 may be approaching a dangerously high concentration of nitrates and potassium. With reference to the probable permeability, this is a value which we have developed at this institution for characterizing the degree of granulation in soils. A probable permeability of 69.3 would be considered high permeably or have a large number of good sized granules while 26.7 would be considered quite poor. It is to be expected that worm casts would show a high permeability.

I am personally interested in observing these differences both nutritionally and physically and I am wondering whether the large nutritional differences are due entirely to the effect of the worm and its alimentary tract or whether additional food was placed on and in this soil from which the worm casts were obtained. I would be pleased to have your information on this line.

I am sending under separate cover copies of certain technical papers which deal with permeability as you may be interested in these and also a copy of our bulletin on soil testing.

Very truly yours,
F. G. Merkle
Professor of Soil Technology

During the following summer I continued with other experiments such as adding a few handfuls of worms, egg capsules, etc. to some tomato plants that had previously been fertilized

with a commercial fertilizer and to plants that had received no fertilizer. In this case I could see little difference in the plants as they approached maturity. The worm fed plants seemed to equal those that had received fertilizer, but I would like to have had an analysis of the fruit. The difference may have shown up there. At least they tasted better.

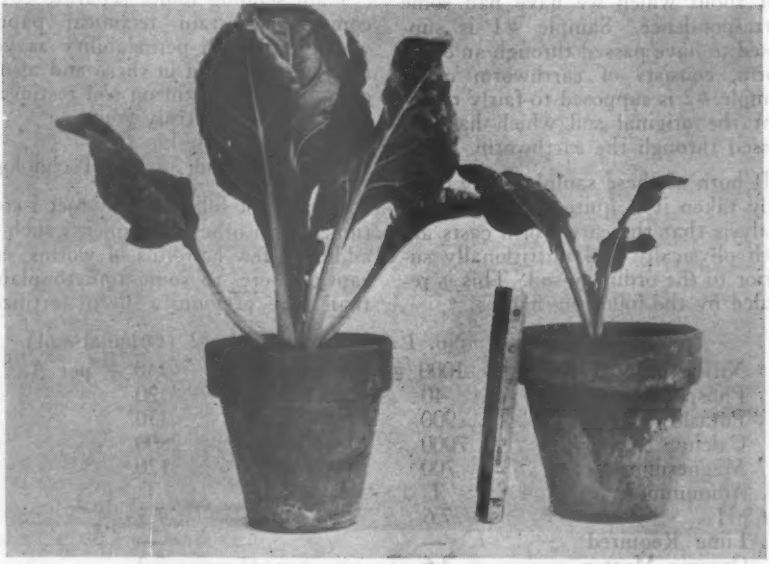
One conclusion can be made however. There is more economy in raising tomatoes in worm infested soil than by fertilizing each year. Once the worms are in the soil they are there year after year.

I would like to mention the experience of a few others who have had success in their experiments with the earthworm.

Mr. John Edwin Hogg reports in the January 1941 issue of Nature Magazine, similar results in his tests on castor beans grown in soil that had been well worked with earthworms. He found the oil content of these beans was about 100% greater, and their size and appearance offered a remarkable contrast.

Dr. George Oliver Sheffield, a descendant of James Oliver, inventor of the steel plow, carried on extensive experiments on his five acre farm in Fort Worth, Texas, prior to his recent death. Primarily, he was testing out some of Darwin's theories and statements, and had unquestionable evidence that Darwin was right.

He found that he could raise worms by the billions by simply making a home for them, feeding them well and encouraging them to be fruitful. With an abundant supply for experiments, he "planted" them in his gardens, around fruit tree, in the lawn, in fact all over his property. His friends were amazed by the beauty of his trees, gorgeous flowers, super-flavored strawberries, and asked how he did it. He kept this a secret for a number of years. He finally sold his medical practice and opened an office in Dallas and Fort Worth, Texas as Landscape Engineer. All the time he was holding his tongue in his cheeks in the hopes that no one would ever read that musty old book of Darwin's and become a competitor.



Cabbage grown in worm castings and in garden soil.

In 1929 he finally decided that the importance of the earthworm to the American farmer was too great to be kept a secret. He published a book in 1941 outlining what he had learned and how the earthworm could serve the farmer in enriching his soil economically. It is really since this advent that the scientists have taken up the matter and expressed their doubts as to the benefits this lowly worm renders. The copyright of this book is held now by *Organic Gardening* and the book has reappeared as an issue of the Gardeners' Book Club.

The Farm Journal, February 1945, reports the evidence offered by Christopher Gallup of Eastern Connecticut that earthworms have increased his yield of corn from 80 to 196 bu. per acre, by encouraging them to multiply in his corn fields through a system of cultivation similar to that advocated by Mr. Edward Faulkner in "Plowmans Folly".

From the pen of the late Mr. T. A. Weston, who was Associate Editor of "Florists Exchange" and a man with an endless store of plantsman knowledge, came the following excerpt from Readers Digest. "Every form of life may be said to do its part in the continuance of our world, and not the least important are the agencies of decomposition, which include lowly animals, fungi and bacteria. Among the first named are earthworms. On untilled soil they pull down organic matter into the ground where it is attacked by bacteria and fungi. The worms eat the decaying material along with the soil and thus help to enrich it. Complete absence of worms is an infallible sign that calcium or lime is lacking, because worms can't live without it. This explains the formation of some peats, the soil being so acid that worms are not present to drag down surface material which lies and does not fully decay".

In American Fruit Grower, November 1942, there appeared an article by Claire Giles "Worms for Prosperity", from which I have taken the following excerpts: "Various branches of the Government are experimenting with the use of earthworms such as those made from the Forestry Service, impregnating seedling pines growing in hard decomposed granite in the Sierra Madre Forest Reserve, each tree being carefully marked. These conifers grew in two years to a height usually requiring five".

"In a report to the Government after the Mississippi Valley floods, a reclamation engineer named Mason said that with the use of earthworms the soil could be reclaimed in about eighteen months, but without them it would require at least ten years".

You may ask "why do you think that agricultural scientists are not responsive to the earthworm theory and show little or no interest?" To begin with, some time ago I wanted to collect what information I could on the subject and turned first to the bulletins of the U. S. Dept. of Agriculture and many of the State Colleges, but in none did I find where any experiments had been carried out in an effort to prove that the earthworm was beneficial to the farmer in any way.

It seems to me that experiments of this nature can and should be carried on by the various agricultural agencies employing scientists, since we pay the bill anyway. New and revolutionary ideas, although some are old as Nature herself, are not likely to be welcomed by the academic world of agriculture; they often upset theories that these scientists had previously taught the farmer, and they are reluctant in giving in.

Since politics seems to enter all branches of services rendered by Government bureau men, one might suspect that there is a political reason for some of this valuable information being kept from the farmer. Many things have been taught the farmer that is really more beneficial to the manufacturers of chemical fertilizers, farm machinery and prepared high priced feeds, than to the farmer or the soil.

by H. K. MEYER

Over the Fence

THIS IS THE LAST TIME I shall appear in an assistant editorial capacity before the readers of *Organic Gardening* with whom I had so many pleasant contacts through the years. It was an interesting epoch in the history of organic matters. When I came, Mr. Rodale's *Pay Dirt* was just going to press; it awakened a wide interest and brought the organic movement to the attention of many who had until then not heard of *Organic Gardening* magazine. As I am leaving, Mr. Rodale is just about to establish a Foundation which will investigate the part of organics in plant and animal feeding. I have learned something as I ran my place organically and I have tried to make my contributions; but other duties and older interests are calling too, and I wish therefore to part from the readers in the hope that they will continue to become even better organic gardeners in the future than they have been in the past. There is no limit to experiences and learning.

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A FEW NEWS items now. *Seed World* writes:

"A warning that seed and fruit production is being greatly reduced through the destruction of wild bees, by insecticides intended for harmful insects, was recently given to Virginia horticulturists by Dr. James Hambleton, U.S.D.A. He stated that, red clover in Virginia, which ordinarily produces eight to ten bushels of seed per acre, is now yielding only about nine-tenths of a bushel because the bee pollinators have been destroyed. Cucumbers, watermelons, pumpkins, and the majority of fruits and legumes are among the things requiring bee pollination, he pointed out."

SCIENCE NEWS LETTER reported in April as follows:

"Benzene Hexachloride, the new British insecticide, has strange effects on the single-celled citizens of the microscopic world, Dr. Ll. Lloyd of the University of Leeds has discovered. When paramecia, normally neat little slipper-shaped swimming animals, are kept in water containing the poison in dilutions of from one to ten parts per million, they lose their power to divide and form new individuals. Instead, they slowly grow larger, until they are 50% longer and broader than normal. After a while the poison finishes its work, and they die.

"Freak forms have also been observed in some of the lower-strength solutions. Here the cells apparently have not entirely lost the drive for cell-division, but they cannot complete it, and produce "Siamese-twin" animals. If some of these doubled forms are placed in clear water, a veritable frenzy of cell-division takes place, with animals, and even separated parts of animals, produced in all sizes and a wide variation in abnormal numbers of body parts."

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H. J. MULLER, the Nobel Prize winner, whom we have frequently mentioned in these columns beside his friend Edgar Altenburg, the geneticist, told the New York Academy of Medicine a few months ago that physicians should be very careful before they used x-ray treatment. X-rays affect the chromosome system and produce changes in the hereditary set-up. This is terrific! For such gene changes will spread through the populations and then there will be no normal humans left. It was then shown that faulty unnatural processes, that are vigorous of action, may even be the cause of cancer.

Hints From the Gardener

By RAYMOND GREEN

THIS is the gardener. From time to time I will pass on to you the good points in growing. Growing is an art that has to be acquired by long practice and experience and sometimes our experiences don't turn out to our expectations. Perhaps these helpful hints I have gathered through practice will help improve your garden.

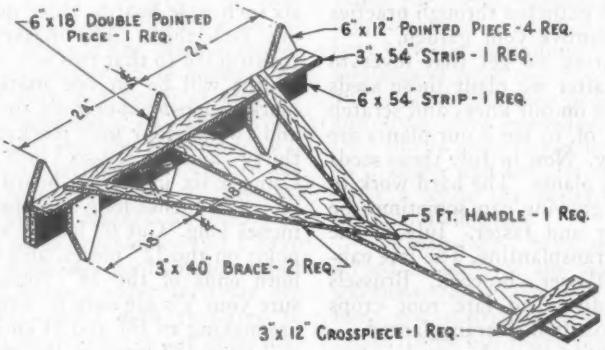
Every spring we get that fever to plant, and after we plant those seeds we get down on our knees and scratch around sort of, to see if our plants are on their way. Now in July those seeds are growing plants. The hard work to keep them growing can sometimes be made easier and faster. July is the month for transplanting. The late cabbage, cauliflower, broccoli, Brussels sprouts, endive and late root crops have to be planted or transplanted.

Transplanting can be made easy. Water is seldom needed if you are using compost. Every gardener should take advantage of weather conditions. Every time it rains or is mucky and cloudy you should be thinking to yourself, "what do I have to be transplanted?" When the soil contains a minimum of moisture you can transplant best by using a heavy foot. "Use a heavy foot" means that after you have placed your plant and covered its roots with soil you should place your foot on both sides of the plant and press the ground firmly. When the ground is compacted firmly capillary attraction of soil moisture brings the moisture up to the roots. Watering is necessary when soil conditions warrant it. A lot of people use water to firm the ground around the roots of their plants when watering would not be needed. Early in the morning, have you noticed how moist your foot prints are? Before transplanting, water your plant roots thoroughly with a solution made from compost in a barrel of water. Delay transplanting on hot sunny days till late afternoon or evening.

Everybody likes to see straight rows. An easy way to make straight rows is to make a hand marker out of six inch wide boards, three quarters or one inch thick. The marker can be constructed so that two sets of varying widths will be on one marker. Two markers most popular are the eighteen and twenty-four inch marker and the thirty and thirty-six inch marker. Using a six inch wide board cut four pieces 12 inches long and one piece 18 inches long. Cut 6" long V's to a ¼" point on the 12" pieces, and 6" V's on both ends of the 18" piece, making sure your V's are only 6" long. If you are making an 18" and 24" marker you nail your 18" piece in the center of a board 4½ ft. long. Use a rule and place one of your 12" pieces 24" from center marker on one side of board and the other 12" piece 24" on the other side of center marker. Measure your distance from center of point of center marker. Now you have a two row marker for planting 24" rows. On the other side of marker place a 12" piece 18" from center marker and the other 12" piece 18" on the other side. Now by turning the marker around you have a two row marker for planting 18" rows. Next nail a strip 3" wide and 4½ ft long across center of marker. To this you nail your handle which should be 5' long and then two bracing strips. The handle is best if made out of a 6" wide board with a 3" wide piece 12" long nailed across it 3" from end of handle. This cross piece makes it easy to guide when marking out your rows. By using a string to make your first row you can mark out any number of rows, always leaving the

last row as a guide to mark out the next rows.

If after marking out your rows you wish to apply composted humus you can dig your holes, place a forkful of compost in each hole, cover with soil and then transplant your plant. When you are planting celery you can dig a continuous trench by following your mark. Apply two inches depth of compost, cover with ground and plant your celery plants six inches apart. To keep your row straight lay out a line over your covered trench and mark


6"x18" Double Pointed Piece - 1 Req.
24"
24"
6"x12" Pointed Piece - 4 Req.
3"x54" Strip - 1 Req.
6"x54" Strip - 1 Req.
5 Ft. Handle - 1 Req.
3"x40" Brace - 2 Req.
3"x12" Crosspiece - 1 Req.

out a shallow row wi-' .. noe. No trowel is necessary for planting celery, just place plants in shallow mark and pull ground from the side of furrow and firm the ground well around roots with your hands. When planting in hills as for cucumbers, squash or melons here are two ways to plant them: Shovel out your holes and apply a forkful of compost. Firm the compost with a hoe and spread your seed on top of the compost. Cover the seed with one inch of fine soil and firm with the back of your hoe. The other method is that after putting your compost in the holes, cover with ground so as to make a hill. Spread your seed (10 to 12 seeds) on top of your hill and press each seed into the ground with your finger. Make sure you press each seed about one half to one inch deep. Firm the soil with your hand.

A few more helpful hints to remember. When picking weeds use a basket. After you have filled your basket use the weeds for composting. The same applies to bean bushes. While picking the last of the beans, pull out the stalks and use them for composting. Bean bushes are wonderful for composting if used while they are green and dry, if wetted down with water. By pulling your bushes and using them for compost you destroy the beetles present and the breeding ground for future bean beetle infestations. After your beans are out just hoe the space up and plant a late root crop. In hot weather pull your bushes and pick them in the shade.

Some pointers on flagstone walks. Before placing your stones, broadcast lawn seed over the area you intend putting your flagstone. As you level each stone your grass seed will tend to work into the area between the stones. Make sure you leave a hollow under each stone and it will not tip or move out of place when walking on it before your grass holds it in place. You can make these hollows by using the handle of a trowel.

While harvesting sweet corn try picking it early in the morning. Soak it in cold water and place in a cool room or refrigerator. Most of all make sure you eat it that same day.

This column on gardening will give you some helpful hints to make your gardening easier and more successful,

for growing flowers and vegetables is really an art requiring a lot of hard work. But as you gather your harvest or admire your work you will have that certain feeling of satisfaction and pride, and down deep that twinkle and inward smile for your own. If you have a gadget or special way for doing things around the garden write to the Gardener and I will pass it on to our friends. Just write The Gardener, Organic Gardening, Emmaus, Pa.

Hemerocallis McFarland

Hemerocallis, (Day Lilies)

By L. L. Dolson

CONTRARY TO popular opinion, the Hemerocallis or Day Lily, is not a native of this country but originated in China. It will grow any place, either in partial shade or full sun; but does best if well supplied with plenty of humus. For best results fertilize only with home-made compost, well-rotted cow manure and bone meal. I have seen Hemerocallis blooming beautifully in one spot for over fifteen years, but they do better and are more floriferous if divided about every five years.

Hyperion, the kind illustrated, is among the best of the pale yellow varieties; but new hybrids come in all colors from light yellow to pink, red and dark maroon. Your seed catalog lists varieties that bloom from early spring until frost. Hemerocallis are "musts" for the modern perennial border.

Our Cucurbitous Vegetables

By M. B. CUMMINGS
Professor Emeritus, University of Vermont

SQUASH and melons, pumpkins and cucumbers constitute our cucurbitous vegetables. The denotation comes from *Cucurbita,* the Latin name of the genus. These plants are often referred to as "vine crops," for all the fruits are borne on herbaceous vines that trail over the ground. Each species is important in one way or another for domestic use or commercial sale, and each has its place in the national food economy. All are important in the home vegetable garden and are profitable to grow under good cultural conditions.

General Requirements

All members are warm temperature plants,—not tolerating even a slight frost without harm; all are insect pollinated; all grow quickly; all thrive in a wide variety of soils but they need prompt attention as the fruits approach maturity or commercial size. Watermelon is the only one to tolerate a somewhat acid soil.

Squashes are Nutritious

This vegetable displays a wide variety for there are many kinds and they vary much in size, shape, color, season and quality. *Cucurbita maxima* includes the true squashes which are distinguished from pumpkins by a soft stem. True squashes include the Hubbard, Essex Hybrid, Delicious, Buttercup and Banana, also King of Mammoth and Mammoth White. The largest pumpkins are technically squashes. The first varieties named above are the most important but Buttercup is notable for its convenient size and high quality; and Butternut is very prolific and has orange fleshed fruits. Acorn is also good for individual servings. Winter squashes will keep for several months in a dry cool place, and be good all the while; they are nutritious. Summer squashes, however, have low food values and are highly perishable. The Golden Cushaw variety is of extra quality. It has good flavor, much vitamin content, and long keeping properties. Yellow squashes are richer than non-yellow ones.

In raising squashes, a good texture loam soil is best. A forkful of well rotted manure with a handful of lime added to it and worked into the soil for each hill will do wonders in stimulating early growth. Plant in hills 8-10 feet apart. Tend them well.

Do not let frost touch the mature fruits. Cover them or harvest before frosted. Squashes change in storage. The starch first changes to sugar so that over-dry squashes become sweet after 6-8 weeks. If kept too long the sugar breaks down and the quality deteriorates. They can be cooked or dried and freshened as desired; or canned for later use. Squash pie is an excellent dessert product, and in much demand in its season.

Muskmelons Rate High

A fully ripe, sweet, rich muskmelon is the epitome of garden products, for there is nothing better for breakfast or for dessert, and as for ease of collecting and economy in preparation, nothing exceeds a good melon.

But before we get started on this story, let us note that muskmelons—not cantaloupes, are most generally grown in this country. A true cantaloupe has a warty exterior, while a real

muskmelon is netted on the surface. These distinctions hold even though the true names are often confused and used interchangeably.

It is the flavor, the fragrance, and the texture that gives prime quality to a melon. But there are four important vitamins in the flesh that also give value to the fruit. Muskmelons have a higher food value than watermelons, for they possess: A, the carotene; B, the thiamine; C, the antiscorbutic acid, and B^2, the riboflavin. Moreover, they are classed in group four or those crops ranking 16-31 in nutrients per pound, acre, and man hours, thus giving good returns.

Climate. Muskmelons are warm climate plants. They need, according to variety, from 85 to 120 days of frost-free weather from seed to maturity. They will not withstand any frost. Warm nights as well as warm days are a prime requirement for rapid growth and fine quality. Hence the grower must select the short season varieties or lengthen the season. And this he can do by advancing the growth in the spring under shelter; or piece out the season in the fall by selecting a nearly frost-free location, or giving shelter or protection against the first fall frost. The most successful procedures aim to combine all these expedients to get full returns.

Soil. Muskmelons do best in sandy loam, for here they develop the highest quality and best fruits in sunny conditions. The land should be in good tilth, should have much manure. Work the land to suppress weeds and conserve moisture. Keep it clean and soft.

Varieties. Experienced growers know what is best for their location. Others need some limits on what to select. Among the better kinds are Hale Best, 88 days, which heads the list. It is medium in size, nearly round, slightly ribbed, and clearly and deeply netted. It has thick orange flesh of high quality. Emerald Gem, 90 days, is fine for home gardens. It is small, very early and of fine quality, poorly netted, and has orange flesh. Bender, 85 days, is well adapted to the northeast district. It is gray-green in color on the surface, but little netted, and has orange flesh. Delicious, 86 days, resembles Bender, which needs 96 days. Hearts of Gold and Honey Rock need 85 days and do better in southern New England. And for a novelty a few hills of Banana Melon, a 98 day one, shaped like a cucumber or banana, have much fragrance, and are worth trying.

Ripening. High quality depends on full healthy foliage, full maturity and warm sunny weather. When the stem parts from the fruit, leaving a circular depression, the melon is ripe or "full slip". It is "half slip" when half the scar adheres to the fruit and half to the stem. The fruit should be yellow between the nets, not green, for high quality. Let the fruit ripen on the vines.

Watermelons Profitable

These are the most highly commercialized members of the cucurbit group, being extensively cultivated in the southern states, and are usually grown on sandy soil; often on newly cleared land which may be rather acid. Watermelons require a long warm season. Its culture is general throughout the south from Florida and Georgia to California. But it can be grown in New Jersey, New York, and Michigan, and short season varieties in southern New England. It is sensitive to frost but is fairly resistant to drought. Its water content of 92% is not as high as its name implies. It is lower than asparagus at 93%, celery at 94%, cucumber at 96% and lettuce at 95%. However, it is delicious and appetizing, though its food value is low. Tom Watson, Cuban Queen and Klondike are leading varieties. White Mountain, a new variety, as the name indicates, originated in New Hampshire. It is a 70 day variety produced by Dr. Yeager of Durham, N. H. It is about six inches long but nearly round and weighs from four to five pounds. The flesh is sweet and nearly red in color. Midget is also a new small one adapted to New England as it is very early. Plant protectors are helpful in water-

melon culture. It is important to know when to pick watermelons for best quality. Thumping is one way. Watch and wait for dead flat sound; if green, there will be a sharp ringing sound. Note also the tendril, which is green when the melon is green. The ground color of the fruit should change to yellow from greenish white. A ripe melon will crackle when pressed. In marketing, all watermelons should be handled carefully. In car loading be sure to prevent rolling and chucking. It is not uncommon to find carred watermelons much injured in transit to northern markets. Cars need ventilating.

Cucumbers are Relishes

Despite their low food value, there is demand for quantities of cucumbers for slicing, for sweet pickles, and for small cucumbers for pickling. A number of northeastern states grow cucumbers for pickling stations and the returns for production are fairly good. In growing this vegetable it is well to be reminded that it is a warm temperature plant and cannot be safely planted till all danger of frost is past, unless the germinating seeds can be easily covered on cool nights. The soil should be friable and well drained. Heavy, hard soil should be avoided. Much manure should be used and the organic content of the soil should be high. Moreover, the soil should be free of acidity. Lime is generally beneficial; often two tons to the acre are needed. A handful to each hill is not too much. Clean cultivation is needed and shallow working, too, for the roots do not go down deeply into the land. Plant the seeds freely, putting in twice as many seeds as are wanted for the right number of plants. As soon as a sure set is secured, thin out to four or five to the hill, spacing them and reserving the best plants.

In the matter of varieties, it may be noted that the white spine sorts are preferred for slicing and for sweet pickles; while for sour pickles for canning, the black spine varieties are generally selected. Pickling means preservation in brine or vinegar. Most pickled cucumbers are made by fermenting the small fruits with salt and lactic acid bacteria at concentrations that prevent spoilage.

Sugar Pumpkins

The New England Pie or Sugar pumpkin is an attractive garden fruit. The golden orange colored, sleek furrowed fruits are used for pies and to feed stock. Small boys prize them for Jack lanterns. They are very ornamental and attractive when on display in the home or at the fairs. On my father's farm in Vermont he grew cartloads of yellow pumpkins, storing them for many weeks for winter use; and feeding the surplus to milk cows who relished them in winter to supplement hay and stover, before the days of the silo. A well ripened pumpkin with its golden flesh abounds in food values, being rich in vitamins and in starches and sugars, thus being very nutritious. Pumpkin pie is a joy!

Large field pumpkins and garden sugar pumpkins are forms of Cucurbita Pepo which are natives of tropical America, even though unknown now anywhere in the wild state. Among the standard varieties are Conn. Field, New England Pie, or small sugar pumpkins; also the Cheyenne Bush; Golden Oblong, Winter Luxury are better quality for table use.

For good preservation and long storage pumpkins should be fully ripe, of large size and firm rind when cut. They should be harvested with stems on and be handled with great care to avoid cuts and bruises. It is well to wear cotton gloves to avoid fingernail cuts. The storage room should be dry and warm with a temperature of 45-50°F. Use the fruits before the spots come on the cheek, as they soon taint the flesh.

An Art

By PAUL PFUND, Elmhurst, Ill.

EARLY observations and impressions often play a significant part in later life. Sound principles always abide.

Recollections of father's composting methods and results are very vivid. Indeed the underlying principle has become integrated in my philosophy and in the sense that it deals with vibrant soil life it has even become romantic.

Father and mother, both natives of Switzerland, also both trained horticulturists, naturally exerted a strong influence, so my training was early and very rigorous. European preparation in their days was by apprenticeship. Father served his in France and Italy as well as in his native country. As was the custom then, he paid for the privilege so he learned well. There was no such thing as "Earn while you learn". It is my hope to do some reasonable measure of justice to their memory and efforts.

At every possible opportunity we would collect sod from nearby areas along roadsides and ditches wherever permission was secured. It was piled in orderly fashion, interspersed with cow and horse manure from one or two family cows, and from horses used for all transportation. All possible additional quantities were also brought in. The horse manure was usually first used for hot beds. More or less time was allowed for fermentation, but rules were not too strictly adhered to, and since the soil was virgin or nearly so, little if any attention was paid to the mineral content. I do not recall that lime and phosphate rock were added. The consistent remarkable results which were obtained attested to the fact that the soil was in good balance. Present day methods of soil analysis were not employed. Not a trace of artificial chemical fertilizer was used. However, a unique test was always a part of the verification of quality of soil and growth.

Greenhouses were maintained as part of the business operations which included landscaping in all of its phases as well as the culturing of a flower and vegetable garden. In the greenhouses during fall and winter were grown such relatively low temperature plants as large-flowering carnations, giant pansies and sweet-scented English violets. The most telling test however was on violets, for it was aimed to have them in full commercial production by Christmas with blooms large enough (when flattened out) to cover a fifty cent coin. I do not recall that we ever failed to accomplish this. I have yet to see finer and longer lasting blooms. Now one might reason that such a method of testing is too cumbersome and slow. Perhaps so. Nevertheless the final infallible test of the quality of any soil is still in what it will actually produce. The stockiness, disease and insect resistant nature of those plants is a picture which never leaves my mind. Composting has surely stood the test of time and contradiction, and is as inviolate and as firmly established as the laws of the universe. Surely it is high time to reiterate and reemphasize the all important underlying principles involved and to sound them forth in no uncertain tones.

The years have brought with them a widely varied horticultural experi-

ence both in the North and in the South. With this has come an ever increasing consciousness of the complex nature of soil. Its marvelous functionings and faithful response to all who intelligently culture it. I stand in awe of its profundity.

In our landscaping operations we are constantly faced with soil conditions which are anything but conducive to immediate or lasting satisfactory results. The mere application of rotted manure or of the average topsoil generally falls short of supplying the real need. The answer is Compost.

Good ideas go begging. Sound convictions are toyed with and the world suffers for want of that which it could and should have. Realizing a need many years ago for commercial quantities of compost we have ourselves developed several types of compost, in which various natural minerals are being blended in proportion to the desired results of fertility and physical properties. Many gardeners who are profoundly convinced that organic gardening is the only true and purely scientific way, have no room for composting nor do they have time to carry on the process. Especially is this true in and around large cities. Currently we are supplying compost for the landscape planting of the world's largest building.

Over a period of five or six years we have included the commercial production in our operations, of so called tender or greenhouse Chrysanthemums. Through the art of composting we have been enabled to bring into maturity the ideal potted mums of low stocky growth with a consequent complete elimination of the need for staking each plant to keep it upright. Among the multitudinous varieties of hybrids there are many with weak stems. Some of these were included in the assortment we grew, but in our compost they grew ideally. Other growers who use artificial chemicals and have seen our plants are flabergasted. To their question "How is it done" we answer, "Its all in the soil". Organic Gardeners, we as a group really have it. We are altogether too modest. Let us stand forth boldly and make Organic Gardening a part of our philosophy. The inviolate laws of the universe are back of us.

And now as to the philosophical phase. I have had a growing conviction for many years that it would be a means of considerable enlightenment and broader understanding to say nothing of added physical well being, if by some simple practical means in the earliest possible years of instruction all children could be inculcated and imbued in heart and mind with the vital importance of soil conservation, and thereby have imparted to them a vivid and growing realization that from it comes all of our food, raiment and shelter. Such a program would continue gains made during the Victory Garden campaign in which many schools took part. I fear most children grow up with the impression that soil is just dirt, implying filth and therefore to be shunned. However, left to themselves we know they just naturally take to the soil as ducks take to water. Too, many times have I seen children severely remonstrated and even punished for as harmless an act as playing in the soil. Let us give them the proper introduction to good mother earth and we will soon see a generation of more intelligent beings insisting upon measures for a truly scientific program of soil conservation.

We know that leaders in many fields of endeavor are coming to a stark realization of the serious decline in nutrition taken as a whole the world over. I am informed thru reliable sources that our government is obliged to constantly lower its required standard of nutrition for the canning industry. All as a result of apathy, abuse, indifference and/or downright ignorance in soil husbandry. This indeed is not the concern alone of agriculturists but of every individual, for obviously we are all so completely dependent upon the products of the land.

Down To Earth

By BLANCHE FEWSTER

Mrs. Fewster's Walnuts

UPON reading paragraph one, page thirty-nine of "Sunflower Seed—the Miracle Food," I began to think that perhaps I am being selfish. The sentence "If there is a way you can get some friend in the country to grow them for you organically please give this serious consideration", started me to thinking.

I have been keeping my Organic Project and produce more or less to and for myself but after reading 'The Fruit Orchard" edited by Organic Gardening and the "Sunflower Seed—the Miracle Food" and prompted by reading the various issues of Organic Gardening, I believe I should tell you of my project. Perhaps I am growing things health-minded people will want to know about.

Because I did not like the vegetables and fruit that I found on the market and liked even less the method by which they were grown; rush, rush, spray, spray, I decided to do something about it. When you come down to it how could a radish flushed to maturity on a flow of chemically filled water and sprayed within an inch of its life taste like a radish.

Taking seriously the advise of an old world sage: "If you do not like the way a thing is done then do it better". I proceeded to do just that. To get down to earth I sailed through the available literature of the practices of production of our country and finding them lacking or not holding what I was seeking for examined the methods of the old world. After all, some of the very old civilizations had knowledge that we have not discovered or have lost in the shuffle of hurry.

December, 1941 I found just the good earth that I was searching for. It had all of the requirements. First it had to be within twenty miles of Portland for that is where I reside. It is seventeen miles out. Second, it had to be on a mountain (something I read in a book about Tibet caused this). It is on Chelaham Mountain. Third, there had to be at least fifteen acres and not more then thirty. It has twenty-five acres. Fourth, it had to have something on the place that I could see would pay the taxes. There are four acres of English walnuts (twelve years old at purchase date) on it besides a family orchard. I have since planted an orchard of Filberts and an orchard of Apricots. Also a G.O.K. row (God Only Knows). I selected varieties of fruit I like and didn't have anything that sounded interesting and different. Five, there had to be live water on the property. There is one year-around stream through the pasture wood lot. There are two springs. There is one well. Six, there had to be some kind of house in case I wanted to stay over to harvest or work. There is a four room cottage.

Because I wanted food grown as God made it I bought land. I bought the land on Chehalm Mountain because it was up toward heaven. And I named my land Eden. Then I proceeded to violate the theories of the spray-em addicts.

First I shall tell you of the walnuts. This section of our country is in the heart of the nut countries. I found that my neighbors, sprayed, poisoned, gassed and plowed violently and then upon harvesting had the nuts bleached for the market and some for the shelled market used gas to open them. They make a good living doing it that way, too.

As first things should come first. I decided to begin on the walnuts. I

am taking the saying, "from the ground up" very seriously. I tested the soil and discovered that there was a boron deficiency. Boron is what makes the leaves nice and green also helps set the nuts and wards off blight. My spraying neighbors shoot for this with varying results. Walnut trees need a good supply of boron and the ground can be bleached and leached until they are on a starvation diet. I added three pounds of natural borax in a circle around each tree (the amount depends on the age and size of tree). I skipped one year and then followed the procedure but only gave each tree one half feeding amount. Thus I have eliminated practically all "Snakeheads" from my orchard. Snakehead is the growth which are long switches nearly free of foliage and more abundent in the tops of the trees. This type of growth is likely to die in winter and trees so affected are full of "die-back". The leaves on my trees are nice and green and not brown, cuped or pox marked. The nuts set on nicely and grow to a good size. So I eliminated the blight spraying.

Next the poison bait which my neighbors plugged into their trees to kill sapsuckers. A sapsucker will girdle a walnut tree with holes and kill limbs and sometimes even kill the entire tree. It seemed to me that the tree would absorb some of the poison from the bait. I decided on a plan to scare the birds away.

Grandma used to tie white strings on a wire to frighten pheasants from her pea row so I got a sack of lime made a whitewash with water and painted the tree trunks up as high as I could reach. I am five feet four. The birds are not my problem any more. The whitewash must scare them or they do not like the taste. Anyway the whitewash keeps the moss off (another spraying omitted) and besides the whitewashed trunks with the very green tops makes the orchard very pretty.

I do not plow my orchard either. Yes, I read Plowman's Folly. I disk downhill then finish cross disking with the contour of the land. I cover crop but turn it down much later then others do here. And I do not leave my ground naked. (More about my compost later).

Upon gathering the nuts I have them dryed without the bleach bath. This year I sold some to a health-minded doctor. I cracked them via me and the hammer; one by one.

I am also growing sunflower seed for my own use. I started after reading a very interesting article about sunflower seed while studying about Russian vitality. I would be happy to enlarge my planting this year if anyone would want some, too. I grow the Russian Mammoth.

I shall skip over my organically grown vegetables which incidentally are a huge success and draw much comment; especially the purple pole bean that I have developed. And now a word about, my Magic Garden as I call it.

The magic garden is my herb garden, grown organically in full sun and rock mulched. Sage, basil, thyme for cooking; horehound, peppermint, catnip for ills of the flesh; rosemary, southenwood, lavender for the nose; these grew in grandma's garden but I have expanded until I am herb slap-happy as my spraying neighbors says. I would be happy to try organically growing any kind of herb I do not have if someone is particularly interested.

At first my neighbors shook their heads and decided it must be beginners luck and later they decided I must have a green thumb. Of course the four pits, or bins to be more correct, that I built in the backyard couldn't have had anything to do with it—much!

One of the biggest assets on the place was the enormous manure pile behind the barn which looked like it had been there since the year One and a pile of clover thrashings left in a heap.

I filled my bins with what I thought I would like if I were an earthworm. One nice layer of that old manure

(this is the dining-room). A thick layer of that clover straw (that is the bedroom). A layer of green grass and weeds fresh from here, there and everywhere (that is the nursery). I top the whole thing off with a nice coat of leaves and stuff from the pasture-woodlot so it won't sprout. For my starter of earthworms to work this castle I dug them up and raised a corner of leaves, tossed them in. I now save a goodly supply from each bin for the next layerings.

On page forty-nine of the January issue of "Organic Gardening", "A Letter From A Doctor" paragraph six, he presumed the red variety of earthworm grew wild somewhere. They do here. The worms I captured in the pasture-woodlot where there is much leafmold, shade and moisture, are red. Those I dug up in the orchard were gray. I thought they were just anemic as they were slower and duller. Perhaps diet has something to do with color. It is a fact that the red flamingo bird will loose its flaming feathers if it does not feed on a certain kind of shell fish found on the water's floor. They will molt and their feathers come in gray like our common Crane's. The National Geographic Magazine explained all about this in one of their issues.

Anyway I thought if I put both kinds in the box they would compete with each other to see who would get the most to eat. I have tried a bin of gray earthworms and a bin of red earthworms in similar conditions to see who is the better worker. I find the combination of both in one box does get quicker results while the separate bins had the red worms the winner. They do not seem to cross-breed. At least I have not found any of them that look like half-breeds yet.

In a book on Indian culture, I read that tribes on the move for fertile land would lay the ground back and if there were no earthworms they would trail on; if there were lots of earthworms they stopped over to grow their crops. This made me curious and I did a bit of research on earthworms. The findings are what lead me to collect up a generous supply and put them to work in my bins. Earthworm secretions of digestions (along the line of pigeon milk) are—but that is a long, although a thoroughly interesting phase of compost via our friend the earth maker.

I must admit my experienced neighbors smile and nod at the doings of 'that fool woman'. But I have achieved what I started out to get—fruit and vegetables, healthful and tasty beyond dreams without spray or poisons.

"I suppose you are going to raise potatoes in your garden?"

"I was, but when I read the directions for planting, I found it would be impossible. They should be planted in hills, and my garden is perfectly level."

—o—

Subsistence Farmer—Last year I got three bushels of potatoes from my garden.

Neighbor—That was splendid.

Subsistence Farmer—Yes, and all I planted was four bushels.

—o—

Robey—Is your garden a success this year?

Lamphier—Yes, my neighbors have already taken two prizes at a poultry show.

—o—

Customer: "Are you sure this milk is fresh?"

Milkman: "Lady, half an hour ago it was grass!"

Lehigh Parkway, Allentown

Clewell

It Can't Be Done

By GLADYS R. GRAHAM,

Balboa, Canal Zone

IN 1942, when enemy submarines were sinking our ships right and left, the Canal Zone was in a situation regarding food—now you have it, now you don't. We were never quite out of canned milk for our babies, but there were a few periods of one to six weeks when we substituted other food for potatoes, eggs, onions or fresh fruits and vegetables because they were all being sunk on the way from the United States.

It wasn't too bad. We used some tasty native fruits and roots. Some more "adventurous" cooks found that green bananas were acceptable in Irish stew, in lieu of Irish potatoes, for example. We were discommoded but never once hungry.

About that time someone wrote a letter to the newspapers suggesting Victory gardens here. No one but the newspaper editor and the anonymous author thought it a good idea. Grow vegetables HERE? "IT CAN'T BE DONE!"

The same people who said it couldn't be done flocked in the cool early mornings to buy fresh vegetables from the Chinese gardeners who had been growing them all year round for a generation. The idea appealed to us, newcomers from Colorado, and the Boss and I felt that there could be no harm in trying. We were starved for our own garden "sass".

Quietly, we sent to the States for seed, and the ship got through! Then began a five-year adventure that has paid off royally.

Our first garden was on the site of an ex-aviary which superseded a Chinese garden. We were in luck but we didn't know it—then. (And we hadn't heard of Organic Gardening.)

Grubbing out a tangled, saw-toothed mat of grass in the heat and humidity nine degrees from the equator cost the lean Head-of-the-house a good many pounds. At last a plot 10' x 30' was cleared and the garden "in". We knew nothing, then, of when to plant in the tropics. Fortunately it was sown during the "San Juan" or little dry season that comes in the middle of the wet months. It thrived as luxuriously as the lush jungle growth in stories—for a while.

One day the Boss called me to come down stairs to the garden. He sounded slightly hysterical, and he had a right to be. Diagonally through the garden, starting at the tomatoes, proceeding across the chard and now halfway through the beans was a 4-inch path of army ants. They were stripping every plant from top to ground as they went. We had read of them in fiction and science. Nothing short of fire or flood would stop them. So for a while we just watched, fascinated.

They formed a two-way stream. Those on one side hustled back from the colony "empty-handed". The other, wider side flowed in a steady rush and rustle of three-eighths-inch insects, each bearing a piece of leaf from three to five times his size. It didn't seem to matter what—palm-leaf, tomato, bean or grass, all went piece-meal to the nest.

The next day after tracking them a quarter of a mile in the wrong direction, and then coming back to the gar-

den and starting the opposite way, we found their home. The nest had many compartments, spread out along twenty feet of hillside. It took six eggs of cyanide, broken into bean-sized pellets, to make an appreciable difference in the population on the paths that diverged in all directions. Some still remained, but they went off into uncultivated bush (jungle) and the ants were welcome to it.

Sixty days from seed we were enjoying our first "impossible" vegetables. How good they were! We feasted, and shared a few with our now-jealous neighbors. Our house was a twelve-family frame and screen building, in which all dozen kitchens looked squarely out on our two-bit garden. It did look tempting when compared with canned stuff, which was mostly dented and rusted outside from the shipping brushes with torpedoes.

And then as our plans grew for a new and bigger plot, come dry season, the Quartermaster put a house right on top of our garden.

We planned another place close by, but before the Boss had put in a week's out-of-hours work, came the Municipal Engineering Division graders, to make another street for more houses.

A couple of weeks' daily walks located one of the oldest streets in Balboa, with houses rickety enough that our short service date could acquire one. We filed our name and waited and waited, and the next September we moved.

Our new next-door neighbor had a large garden, ringed with ten lovely red papaya trees. His interests were mainly boating and deep-sea fishing. At the moment the Navy had appropriated his boat, so he was raising bananas, collards, okra and sweet potatoes.

Very soon we learned the worst. Our nice, high, wide ground was an old railroad embankment, built up above the rest of the town with rocks and dredgings from the channel of the Panama Canal. Our neighbor, "Tex" (who hailed from Florida) allocated a generous portion of the garden to us. Out of one piece ten feet square, the Boss removed eleven wheelbarrowsful of rocks. And so on, through weary weeks, till our plot measured thirty feet by sixty.

About that time someone in the States sent us our first glimpse of "Organic Gardening". We practically memorized that first copy, for we had sent to the States for a soil-testing kit and found that ours lacked *everything*.

We already knew the value of much you taught, and immediately began our search for the ingredients for your compost "recipe". However, the O. G. suggestions for compost materials had not been gauged for our hyper-sanitated Canal Zone where there is no garbage, no refuse, no manure allowed to collect!

First, we located grass. Tropical grass is notoriously not rich, but it *was* grass. That was easy. The Boss haunted the Quartermaster grass cutters with their scythes and gas mowers, and lugged home gunny-sacks full of trimmings in our already sad-looking '35 sedan. But manure?

At first we tried the abbatoir. No help. Then the stables of the Republic of Panama Police Calvary unit. Two barrels, no more. One source after another vanished as we approached. Twice we got a barrel from a small stable in the Zone, but they were NOT supposed to allow it to go anywhere except to the official Sanitary Dept. trucks, and that came to a halt. For a while we considered casting nets for small fish in the Bay, but discarded the idea.

And then we found it! Out in Albrook Field there was a chicken ranch, battery-type. A call or two out there and the problem was solved. I'll admit I was the main and conscientious objector, because I didn't mind riding past the Clubhouse with barrels of chicken manure fore and aft on the bumpers, but I wouldn't let one ounce be toted inside the car. The problem was finally solved when a neighbor became interested in gardening and volunteered the use of his trailer for a

share in the finished compost. The Boss drove out once a week after work, loaded the trailer, arrived home about sundown and worked like mad to get the manure under grass and leaves so it should not attract flies and attention the next day.

A few times neighbors did complain about the aroma of our new compost piles. (Twice, when dogs had torn into the fresh heap to disinter dead chickens.) But by the time anyone in authority got around to the vicinity, the smell was always completely gone.

After a while the first two compost piles were "done" and spread. Two more took their place. In the meantime, we had been spading or cutting in cover crops as fast as we could get them up. As we composted, we mulched atop the whole garden.

Here, an inch of rain in an hour is not unusual. It may happen from six to ten times during wet season. It has rained as much as four inches in two and a half hours, in our back yard—but only once a year or so. To our delight, after trying your methods, the garden not only thrived but IT STAYED PUT. Meanwhile the soil around it and from our neighbor's half flowed past to the sewers, the Canal and the sea. Instead of fighting through a pond of sticky mud, we could walk anywhere in our garden as soon as the rain had let up.

The returns were wonderful. Where nothing but scanty grass had struggled before, there were tomatoes, cucumbers, summer squash, leaf lettuce, string beans, cantaloupes, sweet potatoes, corn, Chinese cabbage, okra, green peppers, kale, chard, cabbage and broccoli, all giving excellent yield and quality. (Of course, we didn't have them all at one time.)

We did have a good many setbacks. Some of them, two-legged, grow the world over. One lovely banana squash was thirty inches long and still growing when boys raided the garden, threw the green tomatoes at each other and the side of the garage, pulled vegetables off the vines, and walked off with our huge prize. Raids became common, and were not limited to daytime and youngsters.

We learned the hard way about seeds which were not mildew-resistant. Our soil, to start with, had an oversupply of nematodes and wire-worms. (I could devote chapters to our fight, and the things we learned about the nematodes, wire-worms and fungi. We DON'T use chemicals, except nicotine sulphate *very rarely*.) Seasonal planting seems to have a good deal to do with avoidance of insect pests, with the possible exception of aphids.

We found that some things just won't grow in the tropical lowlands and that is that. Since others can't stand heavy rains, our variety is limited according to seasons.

But we have managed, with the Boss' sweat and planning, to have some kind of home-grown green stuff available for the table twice a day the whole year long. Here, white men live traditionally out of tin cans. Even lettuce, cabbage and onions come by boat—to say nothing of fruits—including even lemons, oranges, apples, pears, celery and tomatoes. Our vegetables are not many, but they *are* garden-fresh.

The greatest dividend, aside from satisfaction, is that which has boosted our health. Our five-year old boy is the chief garden-raider, and eats green peppers like apples. He adores spinach and salads, fresh from the garden, and eats as much as we do. Once recently, a neighbor brought to our attention the fact that we are the only family which was not represented at the hospital during a six-months period. She wanted to know what we did to be so healthy.

The Boss and I just grinned and nodded in the direction of the garden and the compost pile. "They" still say, however, "Raise vegetables HERE? It can't be done!"

The Brook and Some of Its Inhabitants

By RICHARD HEADSTROM

IT was a water thrush that led me to the brook. I had stopped to watch the antics of a chipmunk when I heard it. Its song was not as loud and ringing as I would have expected it to be and at first I was not sure that it was a water thrush. But when the song was repeated — a few clear, sweet whistles fading away to a delicate diminuendo — I knew I could not be mistaken.

The bird was somewhere toward my left. It was not easy to thread my way through the tangled undergrowth and I had to be careful, too, that I did not warn the bird of my approach by stepping inadvertently on a dry twig or letting a tree branch suddenly swish back. Only once did I have reason to think that I might have alarmed it and that was when a briar provokingly caught in my clothing and I made some slight sound in freeing myself. But there was no retracing my steps and I continued on and in a few moments came upon an open glade through which a murmuring brook flowed lazily on its way.

I did not see the thrush at first and I thought I had frightened it away. But then I saw it—on a log that sloped gently downward into the water. It was teetering up and down and wagging its tail in the most approved manner and was apparently quite unaware of my presence.

The water thrush is not a thrush but a warbler and yet, to look at its speckled throat and breast, one might easily take it for a diminutive thrush. One might, too, think it a baby sandpiper if one should happen to see it run in and out of the little waves along a brook or river shore. It shows an extreme fondness for water and is rarely found far from it, except during migration and while in search of food, when it may alight and feed for a time away from its preferred habitat.

The thrush engaged my attention until it suddenly took alarm at some real or fancied enemy and flew into the woods. Then and only then did I realize what a delightful spot I had happened upon. It was one of those unforgettable days in May when the entire nature world is in a gay and happy mood. The chilling air of early spring had definitely given away to warmer breezes and these but faintly stirred the young and tender leaves which had already begun to dress the naked trees in renewed splendor. Above, fleecy clouds moved across an azure sky, briefly intercepting the sunbeams which danced upon the dimpled surface of the brook, as it travelled a meandering path through the grassy glade to disappear again into the shady woods where Jack-in-the-pulpits were blooming amid the leafy crowns of the skunk cabbage. Here too I later found the dogtooth violet but at the moment I had an eye rather for the golden yellow flowers of some marsh marigolds where bees of various kinds—honey bees, mining bees and bumblebees—were breakfasting. Syrphidae flies were there too—gorgeous little creatures which seem to favor blossoms as gaily colored as their own lustrous bodies. Dragon flies darted swiftly here and there, alighting now and then on the unrolling fiddlehead of some cinnamon fern or some other

leafy blade. Watching these beautiful insects, it seemed incredible that the silly notions that they sew up the ears and lips of children or that they bring dead snakes to life could ever have met with popular credence. These insects are entirely harmless and dangerous only to other insects on which they feed; indeed, they are our friends and allies in our war against various insect pests and are especially valuable in battling mosquitoes, since the nymphs feed upon the wrigglers in the water and the adults upon the mosquitoes as they hover over ponds and streams laying their eggs.

The young or nymphs of the dragon flies live in the water until they get their wings and catch their prey in a very different manner than that practiced by the adults. The mouth of the nymph is strangely modified. The lower lip is folded back under the head to form a long, hinged apparatus with sharp teeth at its extremity. This peculiar structure has been called a mask, since it can be folded to cover the lower part of the face. When folded, the head of the nymph is quite innocent-looking.

But woe to any unsuspecting victim that should come close, for then the mask is unfolded and extended and the unhappy victim is seized with the teeth and drawn back into the mouth. The behavior of the nymphs is one of great caution and deliberation. They crawl slowly about, and when they spy a likely victim steal toward it and seize it swiftly and suddenly.

These nymphs also breathe in a peculiar way. The rectum is furnished with an intricate meshwork of infolding air tubes known as "rectal gills", which take the oxygen from the water that is sucked into the rectum. This strange breathing apparatus likewise serves as a means of locomotion, for the water which is sucked in for breathing purposes may be forcibly expelled, the insect being propelled through the water as a result.

The nymphs take some time to mature, passing through a number of molts, the number depending upon such external conditions as food supply, temperature of the water and other factors. After about a dozen molts the wings begin to protrude from the upper ridges around the thorax. When these wings become long and begin to stand out from the body, the nymphs climb out of the water and up the stems of water plants. Here they cling until the skin splits along the length of the back, when they crawl out of it and vibrate their wings rapidly. They now wait for their wings to dry and harden and for the blood to circulate through them. After about fifteen minutes, the transformation from the nymphal stage to the adult is completed and they fly away, leaving their old skins still attached to the plant stems.

Damsel flies were there too. They are more brilliantly colored than the dragon flies and are more slender and delicate in form. Unlike the "dragons" that cut through the air like arrows, they fly about leisurely and loiter along the stream banks. They are not as powerful flyers and may frequently be seen flying tandem. Quite frequently the male, flying in front of his mate, accompanies her on her egg-laying expeditions, even submerging with her when she descends to place her eggs inside the stems or leaves of submerged plants. Possibly the males are of real help on such occasions for the legs of damsel flies (and dragon flies, too, for that matter) are not particularly fitted for walking and it is difficult for them to crawl up through the water's "film" (surface tension) but through their combined efforts the male manages to break through, when he uses his wings to bring the female out.

Blackwings — the familiar damsel flies with brilliant green or blue bodies and black wings—were rather abundant and fluttered about with all the uncertainty of butterflies. Now and then one of them would alight among some forget-me-nots that blossomed along the brookside and for a moment were lost from view so well did it

blend with the little blue flowers. These flowers get their name from the popular legend which tells how a lover, when trying to gather some of the blossoms, fell into a deep pool and as he sank threw a bunch of them on the bank, calling out, "Forget me not."

Water striders skated over the limpid water of the brook on their spider-like legs, doing their best to avoid the ripples sent out in ever-widening circles by whirligig beetles. Scarlet patches could be seen on some of them—the scarlet bag-like bodies of water mite larvae which had fastened themselves on to the unfortunate victims, to be carried about until they had completed their growth when they themselves would take up a free-swimming existence. One might well wonder how the striders can skim over the water, often jumping up and landing again, all without breaking the surface film. They can do so because their hairy legs are not wetted and so, with the slight pressure of their weight, they dimple but do not break the surface film. Frequently these dimples cast shadows on the brook bed which were even more noticeable than the creatures themselves.

The whirligig beetles were even more fascinating to watch then the striders. These small, steel-blue insects are well fitted for an aquatic habitat. The smoothly oval contour and polished surface of their bodies serve to lessen resistance as they move through the water. Their hind legs are paddle-shaped and fringed with long hairs and thus make efficient oars. And when they dive they carry down with them a bubble of air at the tips of, and under, their wings, which permits them to breathe while submerged.

These beetles spend most of their time on the surface of the water where they rest motionless or circle around and around each other, sometimes at an almost dizzy pace, but they frequently take to flight if they can climb out of the water to get a start. If disturbed they squeak by rubbing the tip of the abdomen against the wings and upon being captured they emit a disagreeable milky fluid.

The females lay a number of elongate, white eggs, end to end, upon the leaves of such water plants as the pondweeds. The larvae, which are almost never seen, are pale slender creatures and look like centipedes. They crawl about the bottom or swim through the water with a sinuous motion of their bodies. Eight heavily fringed gills hang from each side of the abdomen and these aid in swimming. They are predaceous in habit and feed upon such water insects as the nymphs of mayflies and dragon flies. They become full grown about the first of August and at that time creep out of the water and climb up some reed or grass blade where they spin grayish cocoons pointed at both ends.

Beneath the surface of the water a backswimmer, disturbed by my moving, dived to the bottom where it clung by its front feet to a plant stem. One or two water boatmen appeared for a moment and several water beetles of the genus Haliplidae crawled about among some filamentous algae, from which a scud suddenly emarged only to disappear as quickly, and what appeared to be a brown, water-logged stick proved to be a water scorpion. Numerous snails could be seen attached to the submerged vegetation and I identified several of them as fresh water limpets. Pill clams, too, were there. From out behind some algae-covered rocks, gently washed by the brook, a black-nosed dace glided into the glimmering light of the water. I found more of these minnows in a cascade some distance upstream. Curious to discover the source of the brook I traced its course through the woods and up the wooded hillside but I did not get beyond the cascade for the animal population of the brook at this point so fascinatetd me that I spent the remainder of the day there. And never did I return to the brook though I have carried it in my memory ever since.

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Over fifty herbs are discussed and illustrated with sketches. Which ones to grow from seeds, which methods of cultivation to follow, what uses to find, how to cure them, and other such questions are clearly stated and developed. A useful and attractive booklet.

James P. Haworth, PLANT MAGIC (Binfords and Mort, Portland, Oregon. 1946. $3.00)

This is an unusual book, written not by a plant man, but by an engineer whose hobby is playing with plant breeding. The major part of the book is devoted to the technique of changing the hereditary make-up of plants by means of colchicine, the substance derived from fall-flowering crocus. With the help of this book anyone can make experiments. Every step is described. The introduction on heredity is sound, but unfortunately a little too general. If you want to know why a double-flowering stock does not set seed, while the single-flowering does universally, then such a book as Haworth's will not give you an answer. For that you must turn to the one by Lawrence, recently discussed in this column. Thus much experimenting may be in vain unless you have a relatively good knowledge of plant relationships to begin with. Colchicine cannot produce a miracle, even though it may seem magic that man's interference can produce some mutations. Recent instances of successful ones are the Westwood Beauty Dianthus of Bodger Seeds Ltd. and the Tetrasnap of Burpee. Who knows whether we won't get another such flower if many people start playing with Haworth's advice. The book is clearly written for the average man and quite a wise and human book too. Recommended.

Ellwood and George Harrar, GUIDE TO SOUTHERN TREES (McGraw-Hill Book Co., 330 West 42, New York City. $4.50)

A well-made, useful handbook with keys and illustrations to take care of the Southern part of the United States, not including California, this book should supplement the

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Margaret McKenny, BIRDS IN THE GARDEN AND HOW TO ATTRACT THEM (The University of Minnesota Press, Minneapolis, Minn. $5.00)

Hundreds of excellent photographs and numerous colored plates in excellent execution adorn this magnificent book. Topics discussed include the planting of shrubs etc. which attract birds. Which shrubs in which part of the country? You will find a list. What birds are attracted to what shrubs? You will find an excellent survey. How can we protect birds? What nesting places may we provide, what bird baths? How can we recognize birds by their songs? What is the place of predatory birds in nature? Why do birds migrate? Hundreds of such matters are brought up and discussed. The gardener and lover of nature, the bird specialist and the camera man, the city dweller and the country fellow—everyone will find something he wants to know. And if you are tired and find no energy for reading, turn the pages and enjoy the beauty of the pictures. This is a splendid birthday gift. Especially youngsters, who always are given too much of news, funnies, comics, and other passing matters will find here an easy entry into the beauty of nature. The organic gardeners who are against spray and who wish to rely on their natural helper the birds to control insect pests must especially appreciate this work of love and knowledge. Excellent, and very highly recommended.

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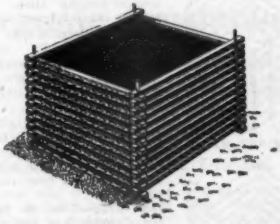

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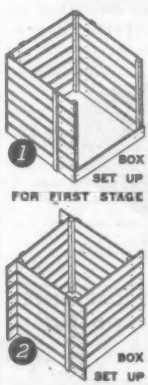

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TOMATOES

January 8, 1947

I have just renewed my subscription to Organic Gardening for two years, having enjoyed and profited by the many good articles and suggestions, and the experience of others, this past year.

We had the finest crop of tomatoes in 1946, as to quality, appearance and quantity, that we have ever had, and finished our last fresh ones for Christmas dinner.

As we have a high altitude and short seasons here, I start the seed boxes about February, and move the growing plants from window to window to get the sun, the east in the morning and west in the afternoon. We have found Pritchard, Scarlet Topper, certified seed, the most satisfactory, although I am going to try Burpee's Victor along with Pritchard this year.

About the 18th of May last year, I began setting the plants out, in the open ground, and built little tepees of sticks and long dry grass over each plant, mulching with grass clippings around the plants. Other years we have always transplanted into individual paper pots, but this time I didn't

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feel up to putting 40 plants into as many pots, as I work in an office and my time in the garden is limited. The weather being favorable, I took a chance of setting them directly in the garden and it worked out fine, which was our first experience, and if the weather permits, I shall do the same again this year. The bed is first prepared in the fall. Leaves are gathered from under our shade trees and spaded into the ground. In the spring old, well-rotted horse manure is spaded into the bed.

The dry grass gradually drops onto the ground from wind, rain and the growing plants and becomes mulch. We hoed the tomatoes twice during the growing season, weeding by hand and keeping a 2 inch mulch of grass clippings all during the summer and fall, as it keeps the fruit clean and off the ground. Twice a week I thoroughly soaked the bed with a fine spray early in the morning before leaving for work. This gave the ground a chance to warm up before the sun set, as our nights are cool to cold.

Early in September the fruit began to ripen. The nights were getting cold, so we covered the plants as soon as the sun went down with the heavy crepe paper nurseries use for shipping stock, as well as old quilts kept for that purpose. Cold, freezing weather came early, so all of the tomatoes, pink, white and green, large and small, had to be picked. Each tomato was then wrapped in two thickness of newspaper, and laid carefully away in baskets and paper boxes in a cool room above freezing. A bushel at a time was brought into a warm room, about 60

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to 70 degrees, to finish ripening for canning and table use. They were delicious, and even the smallest ones made excellent preserves with honey and spices. The tomatoes are not unwrapped until ripe, but should be inspected from time to time.

We gathered 6 bu. of tomatoes from our 40 plants, and by wrapping them in newspapers to ripen, we enjoyed fresh tomatoes at Thanksgiving and again at Christmas, besides all those we gave our friends during the holidays.

Marie S. Holloway,
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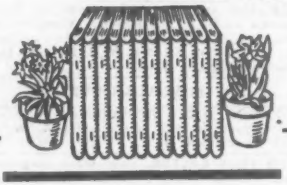

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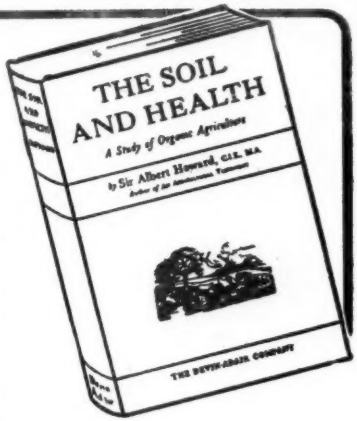

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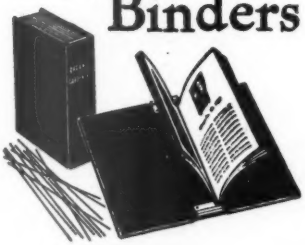

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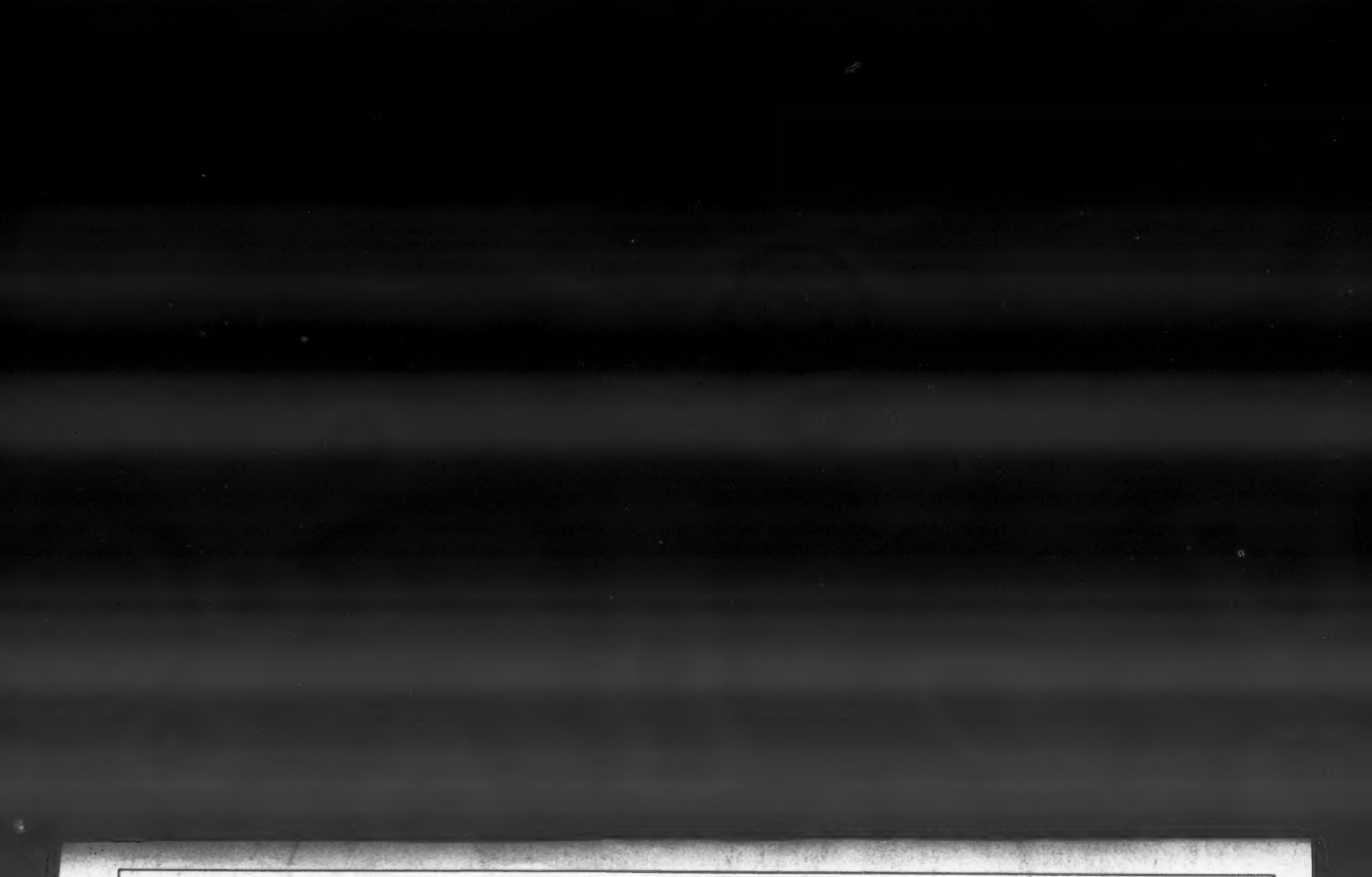
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